US009210548B2

(12) **United States Patent**
**Pitt et al.**

(10) **Patent No.: US 9,210,548 B2**
(45) **Date of Patent: *Dec. 8, 2015**

(54) **IALERT ENHANCED ALERT MANAGER**

(71) Applicant: **TeleCommunication Systems, Inc.**, Annapolis, MD (US)

(72) Inventors: **Lance D. Pitt**, Kent, WA (US); **Thomas Ginter**, Bellevue, WA (US); **Firdaus Aryana**, Seattle, WA (US); **Donald Le Roy Mitchell, Jr.**, Bellevue, WA (US)

(73) Assignee: **TeleCommunication Systems, Inc.**, Annapolis, MD (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/565,787**

(22) Filed: **Dec. 10, 2014**

(65) **Prior Publication Data**

US 2015/0094099 A1 Apr. 2, 2015

**Related U.S. Application Data**

(63) Continuation of application No. 13/338,978, filed on Dec. 28, 2011, now Pat. No. 8,942,743, and a

(Continued)

(51) **Int. Cl.**

| | |
|---|---|
| ***H04W 4/00*** | (2009.01) |
| ***H04W 4/02*** | (2009.01) |
| ***H04W 4/22*** | (2009.01) |

(52) **U.S. Cl.**

CPC ..... ***H04W 4/028*** (2013.01); ***H04W 4/021*** (2013.01); *H04W 4/22* (2013.01)

(58) **Field of Classification Search**

CPC ..... H04W 4/021; H04W 4/22

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,103,073 A 7/1914 O'Connell

4,445,118 A 4/1984 Taylor

(Continued)

FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| WO | WO99/21380 | 4/1999 |
| WO | WO00/40038 | 12/1999 |

(Continued)

OTHER PUBLICATIONS

Intrado Inc., Qwest Detailed SR/ALI to MPC/GMLC Interface Specification for TCP/IP Implementation of TIA/EIA/J-STD-036 E2 with Phase I Location Description Addition, Intrado Informed Response; Apr. 2004; Issue 1.11; pp. 1-57.

(Continued)

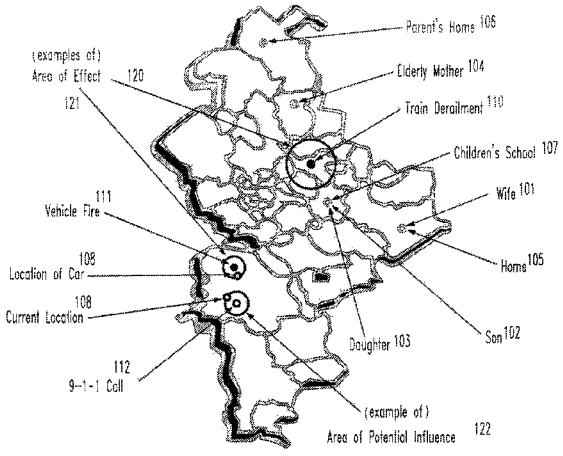
*Primary Examiner* — Bobbak Safaipour

(74) *Attorney, Agent, or Firm* — William H. Bollman

(57) **ABSTRACT**

iAlert_Enhanced_Alert_Manager enables a user to register an interest in their current location, as well as persons, places and/or things in which the user holds some regard. The iAlert_Enhanced_Alert_Manager provides notification and clarifying information to user's devices concerning events/happenstance that have occurred or are likely to occur within a proximity of registered persons, places, and/or things. The iAlert_Enhanced_Alert_Manager comprises data structures (e.g. an Affinity Table, a SPIN table, a SPIN-List Table, an Affinity-List Table, and a Keyword-List Table) to manage affinities, Spheres of Influence (SPINs), and relationships therebetween that may positively or negatively induce a person. Timely notification of events/happenstance to a user comprises the computation of iEvent-vectors and iAlert-vectors. An iEvent-vector contains fields pertaining to events/happenstance whereas an iAlert-vector comprises information pertaining to notifications. Transmission of a notification is determined as a function of the magnitude of an event/happenstance and the proximity of an event/happenstance to registered objects of interest.

**16 Claims, 7 Drawing Sheets**



**Related U.S. Application Data**

continuation-in-part of application No. 13/064,796, filed on Apr. 15, 2011, now Pat. No. 8,688,087.

(60) Provisional application No. 61/457,744, filed on May 25, 2011, provisional application No. 61/457,145, filed on Jan. 14, 2011, provisional application No. 61/457,061, filed on Dec. 17, 2010.

(56) **References Cited**

U.S. PATENT DOCUMENTS


| | | | |
|---|---|---|---|
| 4,494,119 | A | 1/1985 | Wimbush |
| 4,651,156 | A | 3/1987 | Martinez |
| 4,706,275 | A | 11/1987 | Kamil |
| 4,868,570 | A | 9/1989 | Davis |
| 4,891,638 | A | 1/1990 | Davis |
| 4,891,650 | A | 1/1990 | Sheffer |
| 4,910,767 | A | 3/1990 | Brugliera |
| 4,952,928 | A | 8/1990 | Carroll |
| 4,972,484 | A | 11/1990 | Theile |
| 5,014,206 | A | 5/1991 | Scribner |
| 5,043,736 | A | 8/1991 | Darnell |
| 5,055,851 | A | 10/1991 | Sheffer |
| 5,068,656 | A | 11/1991 | Sutherland |
| 5,068,891 | A | 11/1991 | Marshall |
| 5,070,329 | A | 12/1991 | Jasimaki |
| 5,081,667 | A | 1/1992 | Drori |
| 5,119,104 | A | 6/1992 | Heller |
| 5,126,722 | A | 6/1992 | Kamis |
| 5,144,283 | A | 9/1992 | Arens |
| 5,161,180 | A | 11/1992 | Chavous |
| 5,166,972 | A | 11/1992 | Smith |
| 5,177,478 | A | 1/1993 | Wagai |
| 5,193,215 | A | 3/1993 | Olmer |
| 5,208,756 | A | 5/1993 | Song |
| 5,214,789 | A | 5/1993 | George |
| 5,218,367 | A | 6/1993 | Sheffer |
| 5,223,844 | A | 6/1993 | Mansell |
| 5,239,570 | A | 8/1993 | Koster |
| 5,265,630 | A | 11/1993 | Hartmann |
| 5,266,944 | A | 11/1993 | Carroll |
| 5,283,570 | A | 2/1994 | DeLuca |
| 5,289,527 | A | 2/1994 | Tiedemann |
| 5,293,642 | A | 3/1994 | Lo |
| 5,299,132 | A | 3/1994 | Wortham |
| 5,301,354 | A | 4/1994 | Schwendeman |
| 5,311,516 | A | 5/1994 | Kuznicki |
| 5,325,302 | A | 6/1994 | Izidon |
| 5,327,529 | A | 7/1994 | Fults |
| 5,334,974 | A | 8/1994 | Simms |
| 5,335,246 | A | 8/1994 | Yokev |
| 5,343,493 | A | 8/1994 | Karimulah |
| 5,347,568 | A | 9/1994 | Moody |
| 5,351,235 | A | 9/1994 | Lahtinen |
| 5,361,212 | A | 11/1994 | Class |
| 5,363,425 | A | 11/1994 | Mufti |
| 5,365,451 | A | 11/1994 | Wang |
| 5,374,936 | A | 12/1994 | Feng |
| 5,379,451 | A | 1/1995 | Nakagoshi |
| 5,381,338 | A | 1/1995 | Wysocki |
| 5,387,993 | A | 2/1995 | Heller |
| 5,388,147 | A | 2/1995 | Grimes |
| 5,390,339 | A | 2/1995 | Bruckery |
| 5,394,158 | A | 2/1995 | Chia |
| 5,396,227 | A | 3/1995 | Carroll |
| 5,398,190 | A | 3/1995 | Wortham |
| 5,406,614 | A | 4/1995 | Hara |
| 5,418,537 | A | 5/1995 | Bird |
| 5,422,813 | A | 6/1995 | Schuchman |
| 5,423,076 | A | 6/1995 | Westergren |
| 5,432,841 | A | 7/1995 | Rimer |
| 5,434,789 | A | 7/1995 | Fraker |
| 5,454,024 | A | 9/1995 | Lebowitz |
| 5,461,390 | A | 10/1995 | Hosher |
| 5,470,233 | A | 11/1995 | Fruchterman |
| 5,479,408 | A | 12/1995 | Will |
| 5,479,482 | A | 12/1995 | Grimes |
| 5,485,161 | A | 1/1996 | Vaugh |
| 5,485,163 | A | 1/1996 | Singer |
| 5,488,563 | A | 1/1996 | Chazelle |
| 5,494,091 | A | 2/1996 | Freeman |
| 5,497,149 | A | 3/1996 | Fast |
| 5,506,886 | A | 4/1996 | Maine |
| 5,508,931 | A | 4/1996 | Snider |
| 5,513,243 | A | 4/1996 | Kage |
| 5,515,287 | A | 5/1996 | Hakoyama |
| 5,517,199 | A | 5/1996 | DiMattei |
| 5,519,403 | A | 5/1996 | Bickley |
| 5,530,655 | A | 6/1996 | Lokhoff |
| 5,530,914 | A | 6/1996 | McPheters |
| 5,532,690 | A | 7/1996 | Hertel |
| 5,535,434 | A | 7/1996 | Siddoway |
| 5,539,395 | A | 7/1996 | Buss |
| 5,539,398 | A | 7/1996 | Hall |
| 5,539,829 | A | 7/1996 | Lokhoff |
| 5,543,776 | A | 8/1996 | L'Esperance |
| 5,546,445 | A | 8/1996 | Dennison |
| 5,552,772 | A | 9/1996 | Janky |
| 5,555,286 | A | 9/1996 | Tendler |
| 5,568,119 | A | 10/1996 | Schipper |
| 5,568,153 | A | 10/1996 | Beliveau |
| 5,574,648 | A | 11/1996 | Pilley |
| 5,579,372 | A | 11/1996 | Angstrom |
| 5,588,009 | A | 12/1996 | Will |
| 5,592,535 | A | 1/1997 | Klotz |
| 5,594,780 | A | 1/1997 | Wiedeman |
| 5,604,486 | A | 2/1997 | Lauro |
| 5,606,313 | A | 2/1997 | Allen |
| 5,606,618 | A | 2/1997 | Lokhoff |
| 5,606,850 | A | 3/1997 | Nakamura |
| 5,610,815 | A | 3/1997 | Gudat |
| 5,611,050 | A | 3/1997 | Theimer |
| 5,614,890 | A | 3/1997 | Fox |
| 5,615,116 | A | 3/1997 | Gudat |
| 5,621,793 | A | 4/1997 | Bednarek |
| 5,628,051 | A | 5/1997 | Salin |
| 5,629,693 | A | 5/1997 | Janky |
| 5,633,912 | A | 5/1997 | Tsoi |
| 5,636,276 | A | 6/1997 | Brugger |
| 5,661,652 | A | 8/1997 | Sprague |
| 5,661,755 | A | 8/1997 | Van De Kerkhof |
| 5,682,600 | A | 10/1997 | Salin |
| 5,689,245 | A | 11/1997 | Noreen |
| 5,699,053 | A | 12/1997 | Jonsson |
| 5,704,029 | A | 12/1997 | Wright, Jr. |
| 5,721,781 | A | 2/1998 | Deo |
| 5,731,785 | A | 3/1998 | Lemelson |
| 5,740,534 | A | 4/1998 | Ayerst |
| 5,761,618 | A | 6/1998 | Lynch |
| 5,765,152 | A | 6/1998 | Erickson |
| 5,767,795 | A | 6/1998 | Schaphorst |
| 5,768,509 | A | 6/1998 | Gunluk |
| 5,771,353 | A | 6/1998 | Eggleston |
| 5,774,533 | A | 6/1998 | Patel |
| 5,774,670 | A | 6/1998 | Montulli |
| 5,787,357 | A | 7/1998 | Salin |
| 5,794,142 | A | 8/1998 | Vanttila |
| 5,797,094 | A | 8/1998 | Houde |
| 5,797,096 | A | 8/1998 | Lupien |
| 5,802,492 | A | 9/1998 | DeLorrme |
| 5,806,000 | A | 9/1998 | Vo |
| 5,809,415 | A | 9/1998 | Rossmann |
| 5,812,086 | A | 9/1998 | Bertiger |
| 5,812,087 | A | 9/1998 | Krasner |
| 5,822,700 | A | 10/1998 | Hult |
| 5,828,740 | A | 10/1998 | Khue |
| 5,835,907 | A | 11/1998 | Newman |
| 5,841,396 | A | 11/1998 | Krasner |
| 5,857,201 | A | 1/1999 | Wright, Jr. |
| 5,864,667 | A | 1/1999 | Barkam |
| 5,874,914 | A | 2/1999 | Krasner |
| 5,896,369 | A | 4/1999 | Warsta |
| 5,920,821 | A | 7/1999 | Seazholtz |
| 5,922,074 | A | 7/1999 | Richard |

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,930,250 A 7/1999 Klok
5,930,701 A 7/1999 Skog
5,943,399 A 8/1999 Banister
5,945,944 A 8/1999 Krasner
5,946,629 A 8/1999 Sawyer
5,946,630 A 8/1999 Willars
5,950,130 A 9/1999 Coursey
5,950,137 A 9/1999 Kim
5,953,398 A 9/1999 Hill
5,960,362 A 9/1999 Grob
5,974,054 A 10/1999 Couts
5,978,685 A 11/1999 Laiho
5,983,099 A 11/1999 Yao
5,987,323 A 11/1999 Huotari
5,998,111 A 12/1999 Abe
5,999,124 A 12/1999 Sheynblat
6,014,602 A 1/2000 Kithol
6,032,051 A 2/2000 Hall
6,035,025 A 3/2000 Hanson
6,049,710 A 4/2000 Nilsson
6,052,081 A 4/2000 Krasner
6,058,300 A 5/2000 Hanson
6,058,338 A 5/2000 Agashe
6,061,018 A 5/2000 Sheynblat
6,061,346 A 5/2000 Nordman
6,064,336 A 5/2000 Krasner
6,064,875 A 5/2000 Morgan
6,067,045 A 5/2000 Castelloe
6,070,067 A 5/2000 Nguyen
6,075,982 A 6/2000 Donovan
6,081,229 A 6/2000 Soliman
6,081,508 A 6/2000 West
6,085,320 A 7/2000 Kaliski, Jr.
6,101,378 A 8/2000 Barabush
6,104,931 A 8/2000 Havinis
6,108,533 A 8/2000 Brohoff
6,121,923 A 9/2000 King
6,122,503 A 9/2000 Daly
6,122,520 A 9/2000 Want
6,124,810 A 9/2000 Segal
6,131,028 A 10/2000 Whitington
6,131,067 A 10/2000 Girerd
6,133,874 A 10/2000 Krasner
6,134,316 A 10/2000 Kallioniemi
6,134,483 A 10/2000 Vayanos
6,138,003 A 10/2000 Kingdon
6,148,197 A 11/2000 Bridges
6,148,198 A 11/2000 Anderson
6,149,353 A 11/2000 Nilsson
6,150,980 A 11/2000 Krasner
6,154,172 A 11/2000 Piccionelli
6,169,891 B1 1/2001 Gorham
6,169,901 B1 1/2001 Boucher
6,169,902 B1 1/2001 Kawamoto
6,173,181 B1 1/2001 Losh
6,178,505 B1 1/2001 Schneider
6,178,506 B1 1/2001 Quick, Jr.
6,181,935 B1 1/2001 Gossman
6,181,939 B1 1/2001 Ahvenainen
6,188,354 B1 2/2001 Soliman
6,188,752 B1 2/2001 Lesley
6,188,909 B1 2/2001 Alanara
6,189,098 B1 2/2001 Kaliski, Jr.
6,195,555 B1 2/2001 Dent
6,195,557 B1 2/2001 Havinis
6,198,431 B1 3/2001 Gibson
6,199,045 B1 3/2001 Giniger
6,199,113 B1 3/2001 Alegre
6,205,330 B1 3/2001 Winbladh
6,208,290 B1 3/2001 Krasner
6,208,854 B1 3/2001 Roberts
6,215,441 B1 4/2001 Moeglein
6,219,557 B1 4/2001 Havinis
6,223,046 B1 4/2001 Hamill-Keays
6,226,529 B1 5/2001 Bruno
6,239,742 B1 5/2001 Krasner
6,247,135 B1 6/2001 Feague
6,249,680 B1 6/2001 Wax
6,249,744 B1 6/2001 Morita
6,249,873 B1 6/2001 Richard
6,253,074 B1 6/2001 Carlsson
6,253,203 B1 6/2001 O'Flaherty
6,260,147 B1 7/2001 Quick, Jr.
6,266,614 B1 7/2001 Alumbaugh
6,275,692 B1 8/2001 Skog
6,275,849 B1 8/2001 Ludwig
6,278,701 B1 8/2001 Ayyagari
6,289,373 B1 9/2001 Dezonno
6,297,768 B1 10/2001 Allen, Jr.
6,307,504 B1 10/2001 Sheynblat
6,308,269 B2 10/2001 Proidl
6,313,786 B1 11/2001 Sheynblat
6,317,594 B1 11/2001 Gossman
6,321,091 B1 11/2001 Holland
6,321,092 B1 11/2001 Fitch
6,321,257 B1 11/2001 Kotola
6,324,524 B1 11/2001 Lent
6,327,473 B1 12/2001 Soliman
6,327,479 B1 12/2001 Mikkola
6,330,454 B1 12/2001 Verdonk
6,333,919 B2 12/2001 Gaffney
6,360,093 B1 3/2002 Ross
6,360,102 B1 3/2002 Havinis
6,363,254 B1 3/2002 Jones
6,367,019 B1 4/2002 Ansell
6,370,389 B1 4/2002 Isomursu
6,377,209 B1 4/2002 Krasner
6,397,074 B1 5/2002 Pihl
6,400,314 B1 6/2002 Krasner
6,400,958 B1 6/2002 Isomursu
6,411,254 B1 6/2002 Moeglein
6,421,002 B2 7/2002 Krasner
6,427,001 B1 7/2002 Contractor
6,429,808 B1 8/2002 King
6,433,734 B1 8/2002 Krasner
6,434,381 B1 8/2002 Moore
6,442,391 B1 8/2002 Johansson
6,449,473 B1 9/2002 Raivisto
6,449,476 B1 9/2002 Hutchison, IV
6,456,852 B2 9/2002 Bar
6,463,272 B1 10/2002 Wallace
6,477,150 B1 11/2002 Maggenti
6,504,491 B1 1/2003 Christians
6,505,049 B1 1/2003 Dorenbosch
6,510,387 B2 1/2003 Fuchs
6,512,922 B1 1/2003 Burg
6,512,930 B2 1/2003 Sandegren
6,515,623 B2 2/2003 Johnson
6,519,466 B2 2/2003 Pande
6,522,682 B1 2/2003 Kohli
6,526,026 B1 2/2003 Menon
6,529,500 B1 3/2003 Pandharipande
6,529,829 B2 3/2003 Turetzky
6,531,982 B1 3/2003 White
6,538,757 B1 3/2003 Sansone
6,539,200 B1 3/2003 Schiff
6,539,232 B2 3/2003 Hendrey et al.
6,539,304 B1 3/2003 Chansarkar
6,542,464 B1 4/2003 Takeda
6,542,734 B1 4/2003 Abrol
6,542,743 B1 4/2003 Soliman
6,549,776 B1 4/2003 Joong
6,549,844 B1 4/2003 Egberts
6,553,236 B1 4/2003 Dunko
6,556,832 B1 4/2003 Soliman
6,560,456 B1 5/2003 Lohtia
6,560,461 B1 5/2003 fomukong
6,560,534 B2 5/2003 Abraham
6,564,261 B1 5/2003 Gudjonsson
6,570,530 B2 5/2003 Gaal
6,571,095 B1 5/2003 Koodli
6,574,558 B2 6/2003 Kohli
6,580,390 B1 6/2003 Hay
6,584,552 B1 6/2003 Kuno

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,587,691 B1 7/2003 Granstam
6,594,500 B2 7/2003 Bender
6,597,311 B2 7/2003 Sheynblat
6,600,927 B2 7/2003 Hamilton
6,603,973 B1 8/2003 Foladare
6,606,495 B1 8/2003 Korpi
6,606,554 B2 8/2003 Edge
6,609,004 B1 8/2003 Morse
6,611,757 B2 8/2003 Brodie
6,618,593 B1 9/2003 Drutman
6,618,670 B1 9/2003 Chansarkar
6,621,452 B2 9/2003 Knockeart
6,621,810 B1 9/2003 Leung
6,628,233 B2 9/2003 Knockeart
6,633,255 B2 10/2003 Krasner
6,640,184 B1 10/2003 Rabe
6,650,288 B1 11/2003 Pitt
6,661,372 B1 12/2003 Girerd
6,665,539 B2 12/2003 Sih
6,665,541 B1 12/2003 Krasner
6,671,620 B1 12/2003 Garin
6,675,017 B1 1/2004 Zellner
6,677,894 B2 1/2004 Sheynblat
6,680,694 B1 1/2004 Knockeart
6,680,695 B2 1/2004 Turetzky
6,687,504 B1 2/2004 Raith
6,690,940 B1 2/2004 Brown
6,691,019 B2 2/2004 Seeley
6,694,258 B2 2/2004 Johnson
6,694,351 B1 2/2004 Shaffer
6,697,629 B1 2/2004 Grilli
6,698,195 B1 3/2004 Hellinger
6,701,144 B2 3/2004 Kirbas
6,703,971 B2 3/2004 Pande
6,703,972 B2 3/2004 Van Diggelen
6,704,651 B2 3/2004 Van Diggelen
6,707,421 B1 3/2004 Drury
6,714,793 B1 3/2004 Carey
6,718,174 B2 4/2004 Vayanos
6,720,915 B2 4/2004 Sheynblat
6,721,396 B2 4/2004 Chin
6,721,578 B2 4/2004 Minear
6,721,871 B2 4/2004 Piispanen
6,724,342 B2 4/2004 Bloebaum
6,725,159 B2 4/2004 Krasner
6,728,701 B1 4/2004 Stoica
6,731,940 B1 5/2004 Nagendran
6,734,821 B2 5/2004 Van Diggelen
6,738,013 B2 5/2004 Orler
6,738,800 B1 5/2004 Aquilon
6,741,842 B2 5/2004 Goldberg
6,744,856 B2 6/2004 Karnik
6,744,858 B1 6/2004 Ryan
6,745,038 B2 6/2004 Callaway, Jr.
6,747,596 B2 6/2004 Orler
6,748,195 B1 6/2004 Phillips
6,751,464 B1 6/2004 Burg
6,756,938 B2 6/2004 Zhao
6,757,544 B2 6/2004 Rangarajan
6,757,545 B2 6/2004 Nowak
6,771,742 B2 8/2004 McCalmont
6,771,971 B2 8/2004 Smith
6,772,340 B1 8/2004 Peinado
6,775,255 B1 8/2004 Roy
6,775,267 B1 8/2004 Kung
6,775,534 B2 8/2004 Lindgren
6,775,655 B1 8/2004 Peinado
6,775,802 B2 8/2004 Gaal
6,778,136 B2 8/2004 Gronemeyer
6,778,885 B2 8/2004 Agashe
6,781,963 B2 8/2004 Crockett
6,788,249 B1 9/2004 Farmer
6,795,444 B1 9/2004 Vo
6,795,699 B1 9/2004 McGraw
6,799,049 B1 9/2004 Zellner
6,799,050 B1 9/2004 Krasner
6,801,159 B2 10/2004 Swope
6,804,524 B1 10/2004 Vandermeijden
6,807,534 B1 10/2004 Erickson
6,810,323 B1 10/2004 Bullock
6,813,264 B2 11/2004 Vassilovski
6,813,499 B2 11/2004 McDonnell
6,813,560 B2 11/2004 Van Diggelen
6,816,111 B2 11/2004 Krasner
6,816,580 B2 11/2004 Timmins
6,816,710 B2 11/2004 Krasner
6,816,719 B1 11/2004 Heinonen
6,816,734 B2 11/2004 Wong
6,820,069 B1 11/2004 Kogan
6,829,475 B1 12/2004 Lee
6,832,373 B2 12/2004 O'Neill
6,839,020 B2 1/2005 Geier
6,839,021 B2 1/2005 Sheynblat
6,839,417 B2 1/2005 Weisman
6,842,715 B1 1/2005 Gaal
6,847,618 B2 1/2005 Laursen
6,847,822 B1 1/2005 Dennison
6,853,916 B2 2/2005 Fuchs
6,856,282 B2 2/2005 Mauro
6,861,980 B1 3/2005 Rowitch
6,865,171 B1 3/2005 Nilsson
6,865,395 B2 3/2005 Riley
6,867,733 B2 3/2005 Sandhu
6,867,734 B2 3/2005 Voor
6,873,854 B2 3/2005 Crockett
6,876,734 B1 4/2005 Summers
6,882,850 B2 4/2005 McConnell et al.
6,885,874 B2 4/2005 Grube
6,885,940 B2 4/2005 Brodie
6,888,497 B2 5/2005 King
6,888,932 B2 5/2005 Snip
6,895,238 B2 5/2005 Newell
6,895,249 B2 5/2005 Gaal
6,900,758 B1 5/2005 Mann
6,903,684 B1 6/2005 Simic
6,904,029 B2 6/2005 Fors
6,907,224 B2 6/2005 Younis
6,907,238 B2 6/2005 Leung
6,912,230 B1 6/2005 Salkini
6,912,395 B2 6/2005 Benes
6,912,545 B1 6/2005 Lundy
6,915,208 B2 7/2005 Garin
6,917,331 B2 7/2005 Gronemeyer
6,930,634 B2 8/2005 Peng
6,937,187 B2 8/2005 Van Diggelen
6,937,872 B2 8/2005 Krasner
6,940,826 B1 9/2005 Simard
6,940,950 B2 9/2005 Dickinson et al.
6,941,144 B2 9/2005 Stein
6,944,540 B2 9/2005 King
6,947,772 B2 9/2005 Minear
6,950,058 B1 9/2005 Davis
6,957,073 B2 10/2005 Bye
6,961,562 B2 11/2005 Ross
6,963,557 B2 11/2005 Knox
6,965,754 B2 11/2005 King
6,965,767 B2 11/2005 Maggenti
6,968,044 B2 11/2005 Beason
6,970,917 B1 11/2005 Kushwaha
6,973,320 B2 12/2005 Brown
6,975,266 B2 12/2005 Abraham
6,978,453 B2 12/2005 Rao
6,980,816 B2 12/2005 Rohles
6,985,747 B2 1/2006 Chithambaram
6,993,355 B1 1/2006 Pershan
6,996,720 B1 2/2006 DeMello
6,999,782 B2 2/2006 Shaughnessy
7,024,321 B1 4/2006 Deninger
7,024,393 B1 4/2006 Peinado
7,047,411 B1 5/2006 DeMello
7,065,351 B2 6/2006 Carter
7,065,507 B2 6/2006 Mohammed
7,072,667 B2 7/2006 Olrik
7,079,857 B2 7/2006 Maggenti

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,103,018 B1 9/2006 Hansen
7,103,574 B1 9/2006 Peinado
7,106,717 B2 9/2006 Rousseau
7,110,773 B1 9/2006 Wallace
7,123,874 B1 10/2006 Brennan
7,136,466 B1 11/2006 Gao
7,136,838 B1 11/2006 Peinado
7,145,900 B2 12/2006 Nix
7,151,946 B2 12/2006 Maggenti
7,174,153 B2 2/2007 Ehlers
7,177,397 B2 2/2007 McCalmont
7,177,398 B2 2/2007 Meer
7,177,399 B2 2/2007 Dawson
7,200,380 B2 4/2007 Havlark
7,209,758 B1 4/2007 Moll et al.
7,209,969 B2 4/2007 Lahti
7,218,940 B2 5/2007 Niemenmaa
7,221,959 B2 5/2007 Lindquist
7,245,900 B1 7/2007 Lamb
7,246,187 B1 7/2007 Ezra
7,260,186 B2 8/2007 Zhu
7,260,384 B2 8/2007 Bales et al.
7,277,938 B2 10/2007 Duimovich
7,302,582 B2 11/2007 Snapp
7,321,773 B2 1/2008 Hines
7,330,899 B2 2/2008 Wong
7,333,480 B1 2/2008 Clarke
7,369,508 B2 5/2008 Parantainen
7,369,530 B2 5/2008 Keagy
7,382,773 B2 6/2008 Schoeneberger
7,392,240 B2 6/2008 Scriffignano
7,394,896 B2 7/2008 Norton
7,428,571 B2 9/2008 Ichimura
7,436,785 B1 10/2008 McMullen
7,440,442 B2 10/2008 Grabelsky et al.
7,444,342 B1 10/2008 Hall
7,450,951 B2 11/2008 Vimpari
7,471,236 B1 12/2008 Pitt
7,522,182 B2 4/2009 Bang
7,573,982 B2 8/2009 Breen
7,602,886 B1 10/2009 Beech
7,623,447 B1 11/2009 Faccin
7,711,094 B1 5/2010 Olshansky
7,764,961 B2 7/2010 Zhu
7,783,297 B2 8/2010 Ishii
7,787,611 B1 8/2010 Kotelly
7,822,391 B1 10/2010 Delker
7,822,871 B2 10/2010 Stolorz
7,825,780 B2 11/2010 Pitt et al.
7,881,233 B2 2/2011 Bieselin
7,890,122 B2 2/2011 Walsh
7,937,067 B2 5/2011 Maier
8,200,291 B2 6/2012 Steinmetz
8,688,087 B2 * 4/2014 Pitt et al. ..... 455/414.2
8,942,743 B2 * 1/2015 Pitt et al. ..... 455/500
2001/0011247 A1 8/2001 O'Flaherty
2001/0040886 A1 11/2001 Jimenez
2001/0049274 A1 12/2001 Degraeve
2002/0002036 A1 1/2002 Uehara
2002/0037735 A1 3/2002 Maggenti
2002/0052214 A1 5/2002 Maggenti
2002/0061760 A1 5/2002 Maggenti
2002/0069079 A1 6/2002 Vega
2002/0069529 A1 6/2002 Wieres
2002/0077083 A1 6/2002 Zellner
2002/0077084 A1 6/2002 Zellner
2002/0077118 A1 6/2002 Zellner
2002/0077897 A1 6/2002 Zellner
2002/0085538 A1 7/2002 Leung
2002/0086676 A1 7/2002 Hendrey
2002/0098832 A1 7/2002 Fleischer
2002/0102996 A1 8/2002 Jenkins
2002/0102999 A1 8/2002 Maggenti
2002/0111172 A1 8/2002 DeWolf
2002/0112047 A1 8/2002 Kushwaha
2002/0118650 A1 8/2002 Jagadeesan
2002/0123327 A1 9/2002 Vataja
2002/0126656 A1 9/2002 Park
2002/0138650 A1 9/2002 Yamamoto
2002/0147023 A1 10/2002 Sawada
2002/0156732 A1 10/2002 Odijk
2002/0158777 A1 10/2002 Flick
2002/0164998 A1 11/2002 Younis
2002/0173317 A1 11/2002 Nykanen
2002/0174073 A1 11/2002 Nordman
2002/0191595 A1 12/2002 Mar
2003/0009277 A1 1/2003 Fan
2003/0009602 A1 1/2003 Jacobs
2003/0012148 A1 1/2003 Peters
2003/0013449 A1 1/2003 Hose
2003/0016804 A1 1/2003 Sheha
2003/0026245 A1 2/2003 Ejzak
2003/0037163 A1 2/2003 Kitada
2003/0040272 A1 2/2003 Lelievre
2003/0044654 A1 3/2003 Holt
2003/0063730 A1 4/2003 Woodring
2003/0065788 A1 4/2003 Salomaki
2003/0072318 A1 4/2003 Lam
2003/0078064 A1 4/2003 Chan
2003/0081557 A1 5/2003 Mettala
2003/0086422 A1 5/2003 Klinker et al.
2003/0086539 A1 5/2003 McCalmont
2003/0100320 A1 5/2003 Ranjan
2003/0101329 A1 5/2003 Lahti
2003/0101341 A1 5/2003 Kettler
2003/0103484 A1 6/2003 Oommen
2003/0108176 A1 6/2003 Kung
2003/0109245 A1 6/2003 McCalmont
2003/0114157 A1 6/2003 Spitz
2003/0118160 A1 6/2003 Holt
2003/0119521 A1 6/2003 Tipnis
2003/0119528 A1 6/2003 Pew
2003/0125042 A1 7/2003 Olrik
2003/0137961 A1 7/2003 Tsirtsis
2003/0153340 A1 8/2003 Crockett
2003/0153341 A1 8/2003 Crockett
2003/0153342 A1 8/2003 Crockett
2003/0153343 A1 8/2003 Crockett
2003/0161298 A1 8/2003 Bergman
2003/0163483 A1 8/2003 Zingher
2003/0169881 A1 9/2003 Niedermeyer
2003/0186709 A1 10/2003 Rhodes
2003/0187803 A1 10/2003 Pitt
2003/0196105 A1 10/2003 Fineberg
2003/0204640 A1 10/2003 Sahineja
2003/0223381 A1 12/2003 Schroderus
2004/0002326 A1 1/2004 Maher
2004/0032485 A1 2/2004 Stephens
2004/0043775 A1 3/2004 Kennedy
2004/0044623 A1 3/2004 Wake
2004/0047461 A1 3/2004 Weisman
2004/0068724 A1 4/2004 Gardner
2004/0070515 A1 4/2004 Burkley
2004/0077359 A1 4/2004 Bernas
2004/0078694 A1 4/2004 Lester
2004/0092250 A1 5/2004 Valloppillil
2004/0098497 A1 5/2004 Banet
2004/0107143 A1 6/2004 Niemi
2004/0132465 A1 7/2004 Mattila
2004/0150518 A1 8/2004 Phillips
2004/0152493 A1 8/2004 Phillips
2004/0181689 A1 9/2004 Kiyoto
2004/0184584 A1 9/2004 McCalmont
2004/0185875 A1 9/2004 Diacakis
2004/0190497 A1 9/2004 Knox
2004/0198332 A1 10/2004 Lundsgaard
2004/0198386 A1 10/2004 Dupray
2004/0203876 A1 10/2004 Drawert
2004/0203922 A1 10/2004 Hines
2004/0205151 A1 10/2004 Sprigg
2004/0209594 A1 10/2004 Naboulsi
2004/0229632 A1 11/2004 Flynn
2004/0235493 A1 11/2004 Ekerborn
2004/0242238 A1 12/2004 Wang

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0267445 A1 12/2004 De Luca
2005/0003797 A1 1/2005 Baldwin
2005/0028034 A1 2/2005 Gantman
2005/0030977 A1 2/2005 Casey
2005/0039178 A1 2/2005 Marolia
2005/0041578 A1 2/2005 Huotari
2005/0043037 A1 2/2005 Loppe
2005/0053209 A1 3/2005 D'Evelyn
2005/0071251 A1 3/2005 Linden
2005/0071671 A1 3/2005 Karaoguz
2005/0074107 A1 4/2005 Renner
2005/0083911 A1 4/2005 Grabelsky
2005/0086467 A1 4/2005 Asokan
2005/0090236 A1 4/2005 Schwinke
2005/0107673 A1 5/2005 Ball
2005/0112030 A1 5/2005 Gaus
2005/0119012 A1 6/2005 Merheb
2005/0125376 A1* 6/2005 Curtis et al. ..... 707/1
2005/0134504 A1 6/2005 Harwood
2005/0135569 A1 6/2005 Dickinson
2005/0136885 A1 6/2005 Kaltsukis
2005/0148346 A1 7/2005 Maloney
2005/0149430 A1 7/2005 Williams
2005/0169248 A1 8/2005 Truesdale
2005/0174991 A1 8/2005 Keagy
2005/0186937 A1 8/2005 Graham
2005/0190892 A1 9/2005 Dawson
2005/0192822 A1 9/2005 Hartenstein
2005/0201358 A1 9/2005 Nelson
2005/0201529 A1 9/2005 Nelson
2005/0209995 A1 9/2005 Aksu
2005/0213716 A1 9/2005 Zhu
2005/0215233 A1 9/2005 Perera
2005/0216300 A1 9/2005 Appleman
2005/0232252 A1 10/2005 Hoover
2005/0238156 A1 10/2005 Turner
2005/0250516 A1 11/2005 Shim
2005/0259675 A1 11/2005 Tuohino
2005/0265318 A1 12/2005 Khartabil
2005/0271029 A1 12/2005 Iffland
2005/0282518 A1 12/2005 D'Evelyn
2005/0287979 A1 12/2005 Rollender
2005/0289097 A1 12/2005 Trossen
2006/0008065 A1 1/2006 Longman et al.
2006/0010200 A1 1/2006 Mousseau
2006/0020424 A1* 1/2006 Quindel ..... 702/183
2006/0023747 A1 2/2006 Koren et al.
2006/0026288 A1 2/2006 Acharya
2006/0036680 A1 2/2006 Shim
2006/0053225 A1 3/2006 Poikselka
2006/0058042 A1 3/2006 Shim
2006/0058045 A1 3/2006 Nilsen
2006/0058102 A1 3/2006 Nguyen et al.
2006/0068753 A1 3/2006 Karpen
2006/0079249 A1 4/2006 Shim
2006/0104306 A1 5/2006 Adamczyk
2006/0106774 A1 5/2006 Cohen
2006/0120517 A1 6/2006 Moon
2006/0128395 A1 6/2006 Muhonen
2006/0135177 A1 6/2006 Winterbottom
2006/0188083 A1 8/2006 Breen
2006/0193447 A1 8/2006 Schwartz
2006/0206610 A1 9/2006 Ling
2006/0212558 A1 9/2006 Sahinoja
2006/0212562 A1 9/2006 Kushwaha
2006/0225090 A1 10/2006 Shim et al.
2006/0234639 A1 10/2006 Kushwaha
2006/0234698 A1 10/2006 Fok
2006/0239205 A1 10/2006 Warren
2006/0258380 A1 11/2006 Liebowitz
2006/0293024 A1 12/2006 Benco
2006/0293066 A1 12/2006 Edge
2007/0003024 A1 1/2007 Olivier
2007/0019614 A1 1/2007 Hoffmann
2007/0022011 A1 1/2007 Altberg
2007/0026854 A1 2/2007 Nath
2007/0026871 A1 2/2007 Wager
2007/0027997 A1 2/2007 Polk
2007/0030539 A1 2/2007 Nath
2007/0036139 A1 2/2007 Patel
2007/0037585 A1 2/2007 Shim
2007/0041513 A1 2/2007 Gende
2007/0049288 A1 3/2007 Lamprecht
2007/0060097 A1 3/2007 Edge
2007/0072624 A1 3/2007 Niemaenmaa
2007/0081635 A1 4/2007 Croak
2007/0082681 A1 4/2007 Kim
2007/0082682 A1 4/2007 Kim
2007/0115941 A1 5/2007 Patel
2007/0121601 A1 5/2007 Kikinis
2007/0149213 A1 6/2007 Lamba
2007/0160036 A1 7/2007 Smith
2007/0162228 A1 7/2007 Mitchell
2007/0167177 A1 7/2007 Kraufvelin
2007/0182547 A1 8/2007 Wachter
2007/0182631 A1 8/2007 Berlinsky
2007/0201623 A1 8/2007 Hines
2007/0206568 A1 9/2007 Silver
2007/0206613 A1 9/2007 Silver
2007/0242660 A1 10/2007 Xu
2007/0243885 A1 10/2007 Shim
2007/0263610 A1 11/2007 Mitchell
2007/0263611 A1 11/2007 Mitchell
2007/0270164 A1 11/2007 Maier
2008/0032703 A1 2/2008 Krumm
2008/0037715 A1 2/2008 Prozeniuk
2008/0063153 A1 3/2008 Krivorot
2008/0065775 A1 3/2008 Polk
2008/0109650 A1 5/2008 Shim
2008/0117859 A1 5/2008 Shahidi
2008/0160953 A1 7/2008 Mia
2008/0186164 A1 8/2008 Emigh
2008/0192731 A1 8/2008 Dickinson
2008/0208671 A1 8/2008 Ehrlich
2008/0214202 A1 9/2008 Toomey
2008/0268769 A1 10/2008 Brown
2009/0029675 A1 1/2009 Steinmetz
2009/0198733 A1 8/2009 Gounares
2009/0204471 A1 8/2009 Elenbaas et al.
2009/0204600 A1 8/2009 Kalik
2009/0237210 A1 9/2009 Ciesla
2010/0010860 A1 1/2010 Bose
2010/0021013 A1 1/2010 Gale
2010/0138400 A1* 6/2010 Curtis et al. ..... 707/706
2010/0161662 A1* 6/2010 Jonas et al. ..... 707/780
2010/0167691 A1 7/2010 Howarter
2010/0198933 A1 8/2010 Smith
2010/0233991 A1 9/2010 Crawford
2010/0241507 A1* 9/2010 Quinn et al. ..... 705/14.42
2010/0262668 A1 10/2010 Piett
2011/0109468 A1 5/2011 Hirschfeld
2011/0113060 A1 5/2011 Martini
2011/0137549 A1 6/2011 Gupta
2011/0151837 A1 6/2011 Winbush
2011/0207429 A1 8/2011 Maier
2012/0079600 A1 3/2012 Kellerman
2012/0157136 A1* 6/2012 Pitt et al. ..... 455/500
2013/0079152 A1* 3/2013 Hall ..... 463/42

FOREIGN PATENT DOCUMENTS

WO WO01/45342 6/2001
WO WO02/57869 7/2002
WO WO2004/025941 3/2004
WO WO2005/051033 6/2005
WO WO/2006/075856 7/2006
WO WO2007/025227 3/2007
WO WO2007/027166 3/2007
WO WO2009/105603 8/2009

OTHER PUBLICATIONS

International Search Report in PCT/US2007/23243 dated Apr. 2, 2008.

(56) **References Cited**

OTHER PUBLICATIONS

PCT International Search Report (PCTUS2007/23714) and Written Opinion of International Searching Authority, Apr. 18, 2008.
Le-Pond Chin, Jyh-Hong Wen, Ting-Way Liu, The Study of the Interconnection of GSM Mobile Communication System Over IP based Network, May 6, 2001, IEEE, Vehicular Technology Conference, vol. 3, pp. 2219-2223.
Location Based Services V2 Roaming Support (non proprietary), 80-V8470-2NP A, dated Jan. 27, 2005, pp. 1-56.
Yilin Zhao, Efficient and reliable date transmission for cellular and GPS based mayday systems, Nov. 1997, IEEE, IEEE Conference on Intelligent Transportation System, 1997. ITSC 97, 555-559.
Qualcomm CDMA Technologies, LBS Control Plane/User Plane Overview—80-VD378-1NP B, 2006, pp. 1-36.
Bhalla et al, TELUS, Technology Strategy—LBS Roaming Summit, Sep. 19, 2006.
Alfredo Aguirre, Ilusacell, First and Only Carrier in Mexico with a 3G CDMA Network, 2007.
Mike McMullen, Sprint, LBS Roaming Summit, Sep. 19, 2006.
Andrew Yeow, BCE, LBS Roaming Summit, Sep. 19, 2006, pp. 1-8.
Nars Haran, U.S. Cellular, Packet Data—Roaming and LBS Overview, Nov. 2, 2007, pp. 1-15.
Qualcomm CDMA Technologies, LBS Control Plane Roaming—80-VD377-1NP A, 2006, pp. 1-10.
Qualcomm CDMA Technologies, MS Resident User Plane LBS Roaming—80-VC718-1 E, 2006, pp. 1-37.
Intrado MSAG Prep for E911 Program and Documentation. Intrado Inc., Longmont, CO. Sep. 14, 2006. Accessed: Nov. 8, 2011. Idaho PSAP Standards Committee. Idaho Emergency Communications Commission,http://idahodispatch.com/index.php?option=com_documan&task=doc_download&gid=38&ltemid=7.
International Search Report received in PCT/US2012/00266 dated Aug. 3, 3012.
International Search Report received in PCT/US2011/001990 dated Apr. 24, 2012.
International Search Report received in PCT/US2012/066313 dated Feb. 4, 2013.
International Search Report received in PCT/US2012/067857 dated Feb. 20, 2013.
International Search Report received in PCT/US2012/67689 dated Feb. 22, 2013.

* cited by examiner

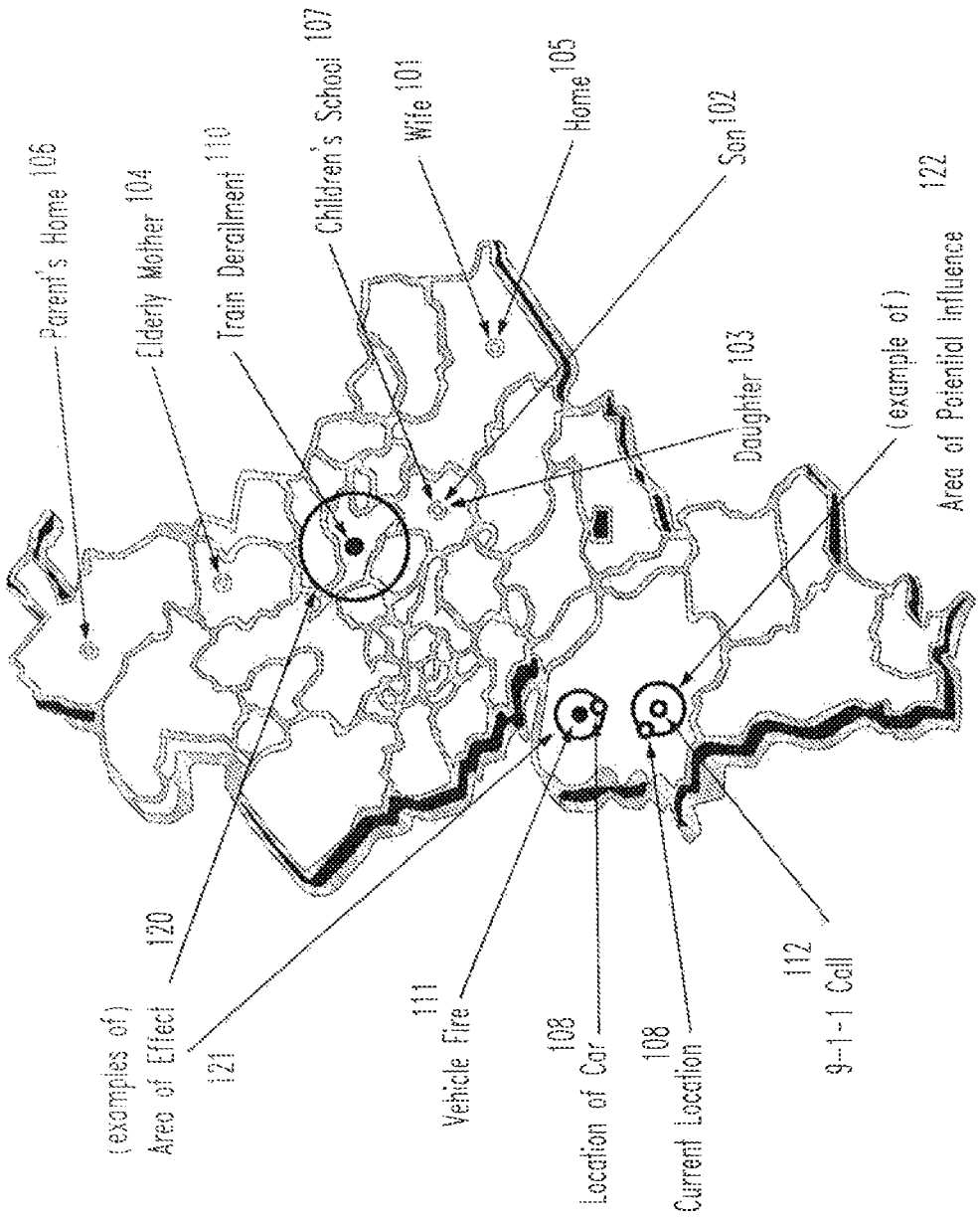

Parent's Home 106
Elderly Mother 104
Train Derailment 110
Children's School 107
Wife 101
Home 105
Son 102
Daughter 103
(example of)
Area of Potential Influence
122
(examples of)
Area of Effect
120
121
Vehicle Fire
111
Location of Car
108
Current Location
108
9-1-1 Call
112

FIG. 1

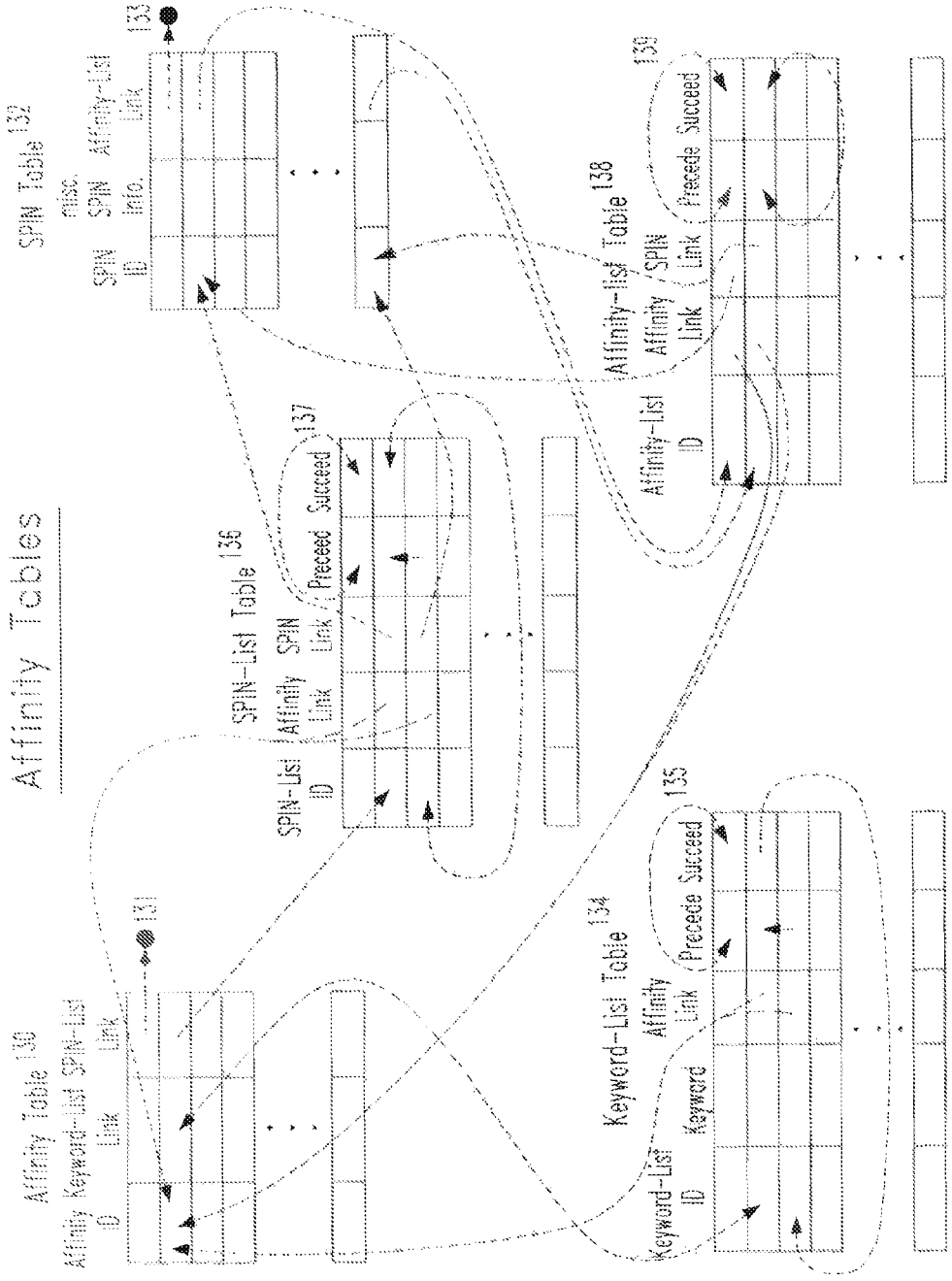

Affinity Tables
Affinity Table 130
Affinity ID
Keyword-List Link
SPIN-List Link
131
SPIN Table 132
SPIN ID
Misc. SPIN Info.
Affinity-List Link
133
Keyword-List Table 134
Keyword-List ID
Keyword
Affinity Link
Precede
Succeed
135
SPIN-List Table 136
SPIN-List ID
Affinity Link
SPIN Link
Precede
Succeed
137
Affinity-List Table 138
Affinity-List ID
Affinity Link
SPIN Link
Precede
Succeed
139

FIG. 2

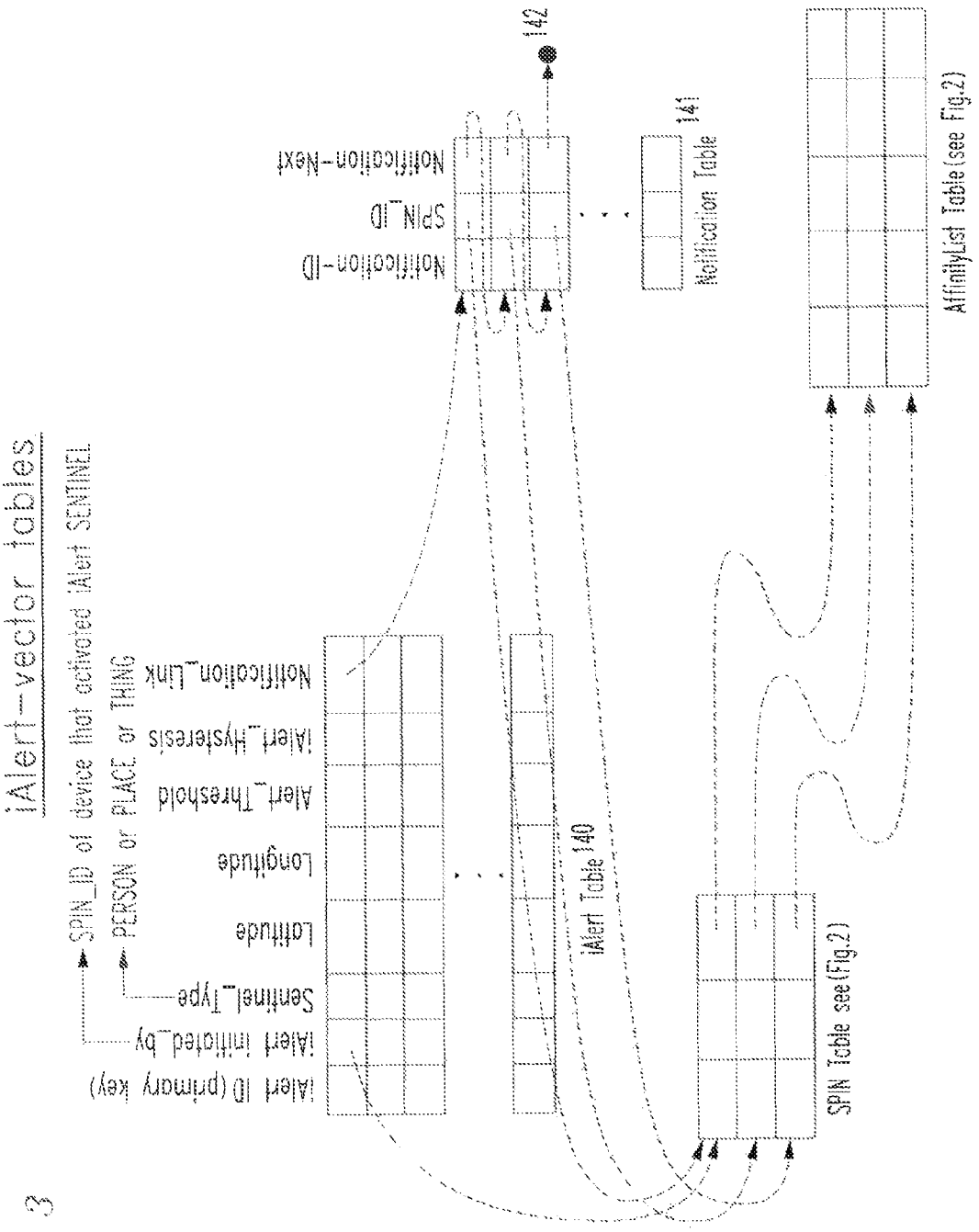

iAlert-vector tables
iAlert ID (primary key)
iAlert initiated_by
Sentinel_Type
Latitude
Longitude
Alert_Threshold
iAlert_Hysteresis
Notification_Link
SPIN_ID of device that activated iAlert SENTINEL
PERSON or PLACE or THING
iAlert Table 140
SPIN Table see(Fig.2)
Notification-ID
SPIN_ID
Notification-Next
142
Notification Table 141
AffinityList Table (see Fig.2)

FIG. 3

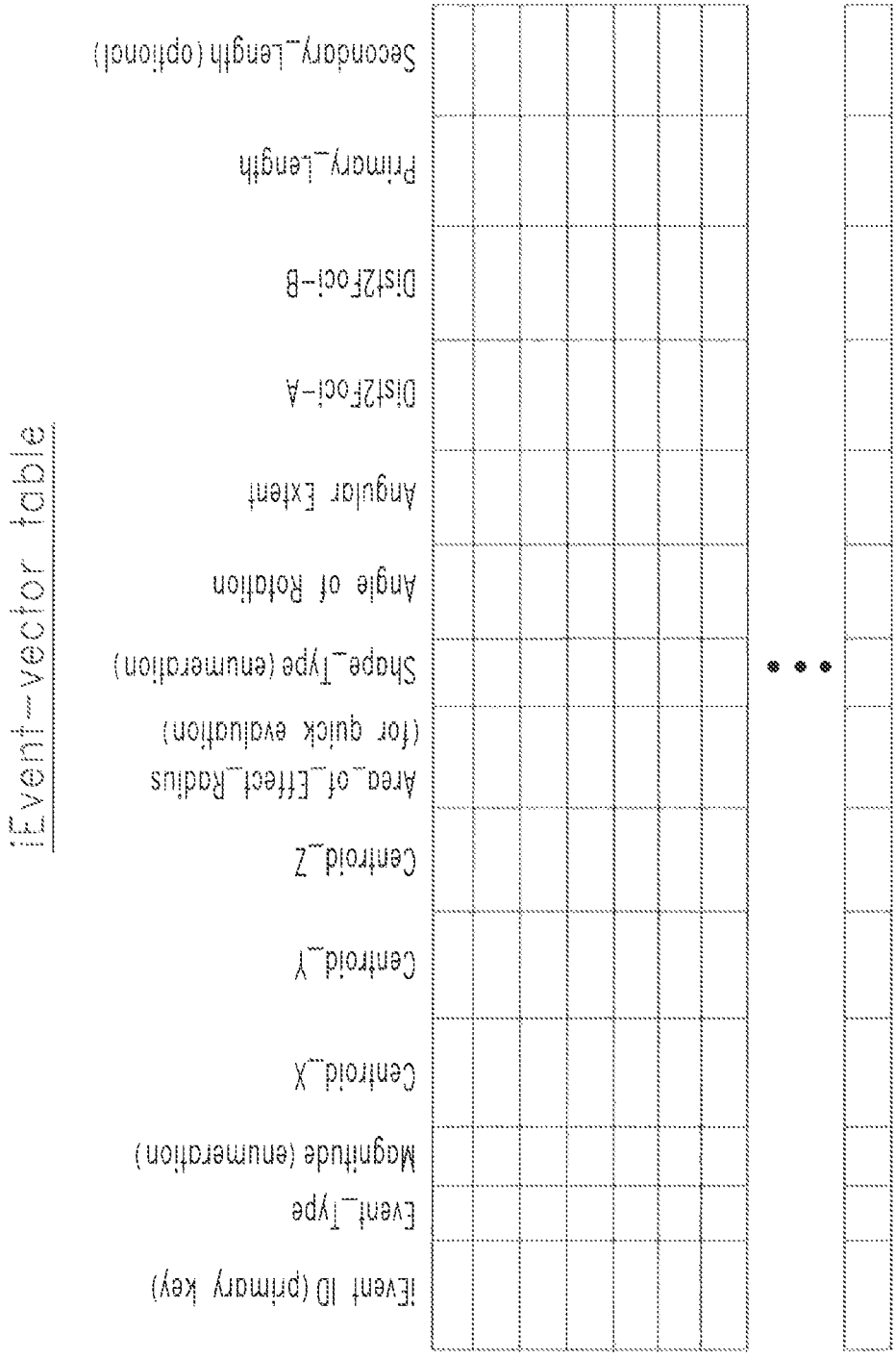

iEvent_vector table
iEvent ID (primary key)
Event_Type
Magnitude (enumeration)
Centroid_X
Centroid_Y
Centroid_Z
Area_of_Effect_Radius
(for quick evaluation)
Shape_Type (enumeration)
Angle of Rotation
Angular Extent
Dist2Foci-A
Dist2Foci-B
Primary_Length
Secondary_Length (optional)

FIG. 4

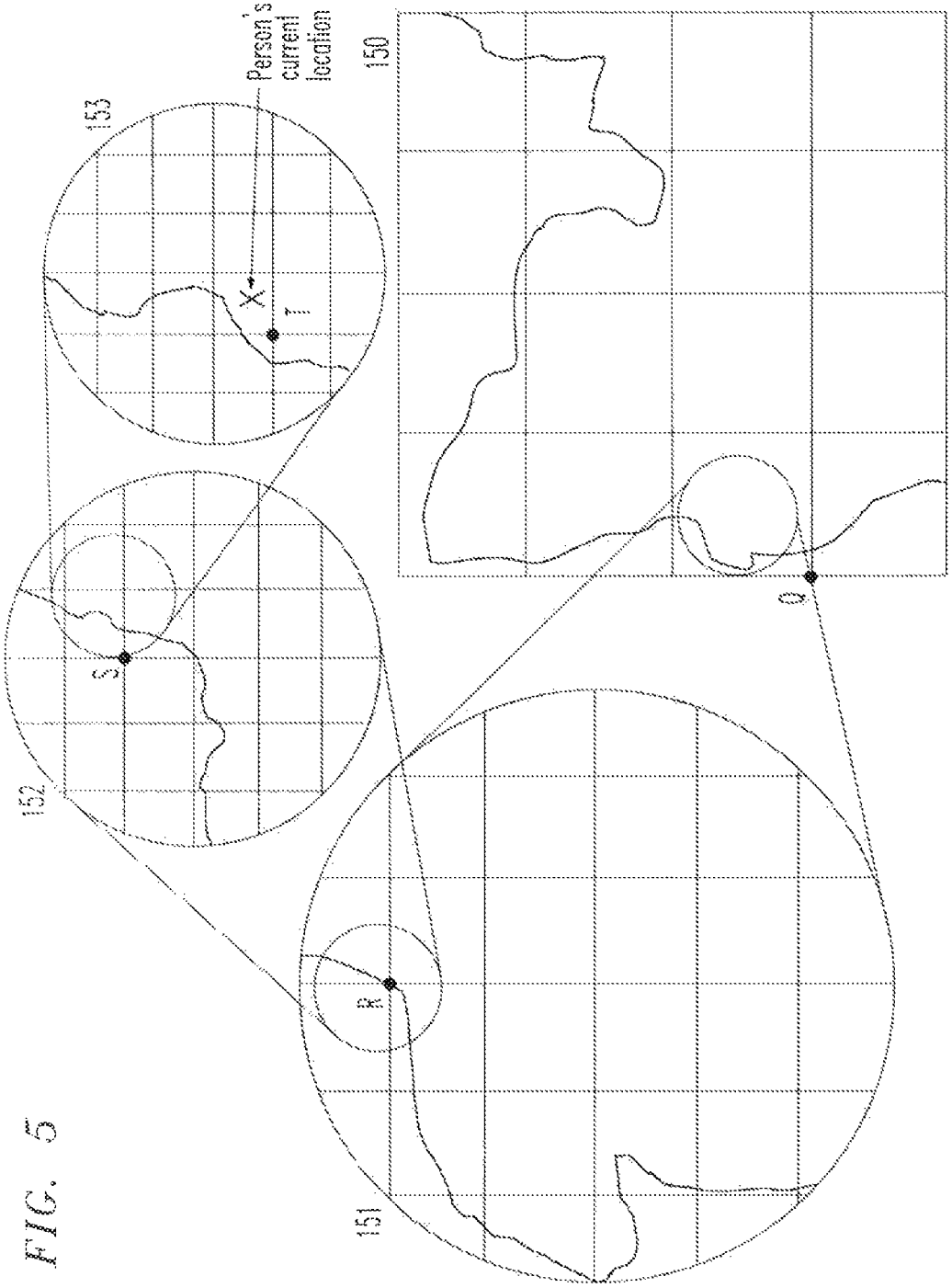
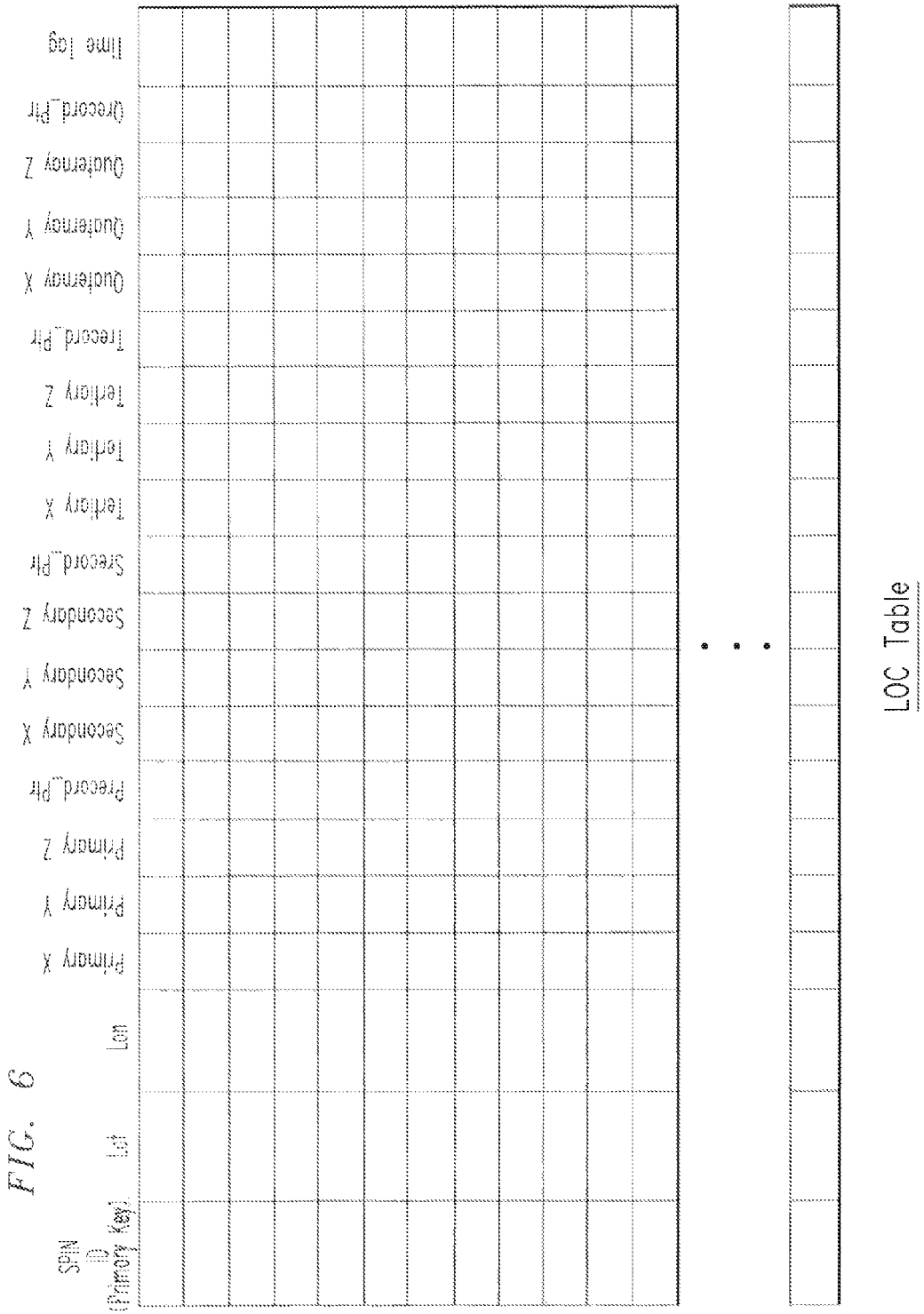



FIG. 5

FIG. 6


SEN ID (Primary Key)
Lat
Lon
Primary X
Primary Y
Primary Z
Precord_Ptr
Secondary X
Secondary Y
Secondary Z
Srecord_Ptr
Tertiary X
Tertiary Y
Tertiary Z
Trecord_Ptr
Quaternay X
Quaternay Y
Quaternay Z
Qrecord_Ptr
Time Tag
LOC Table

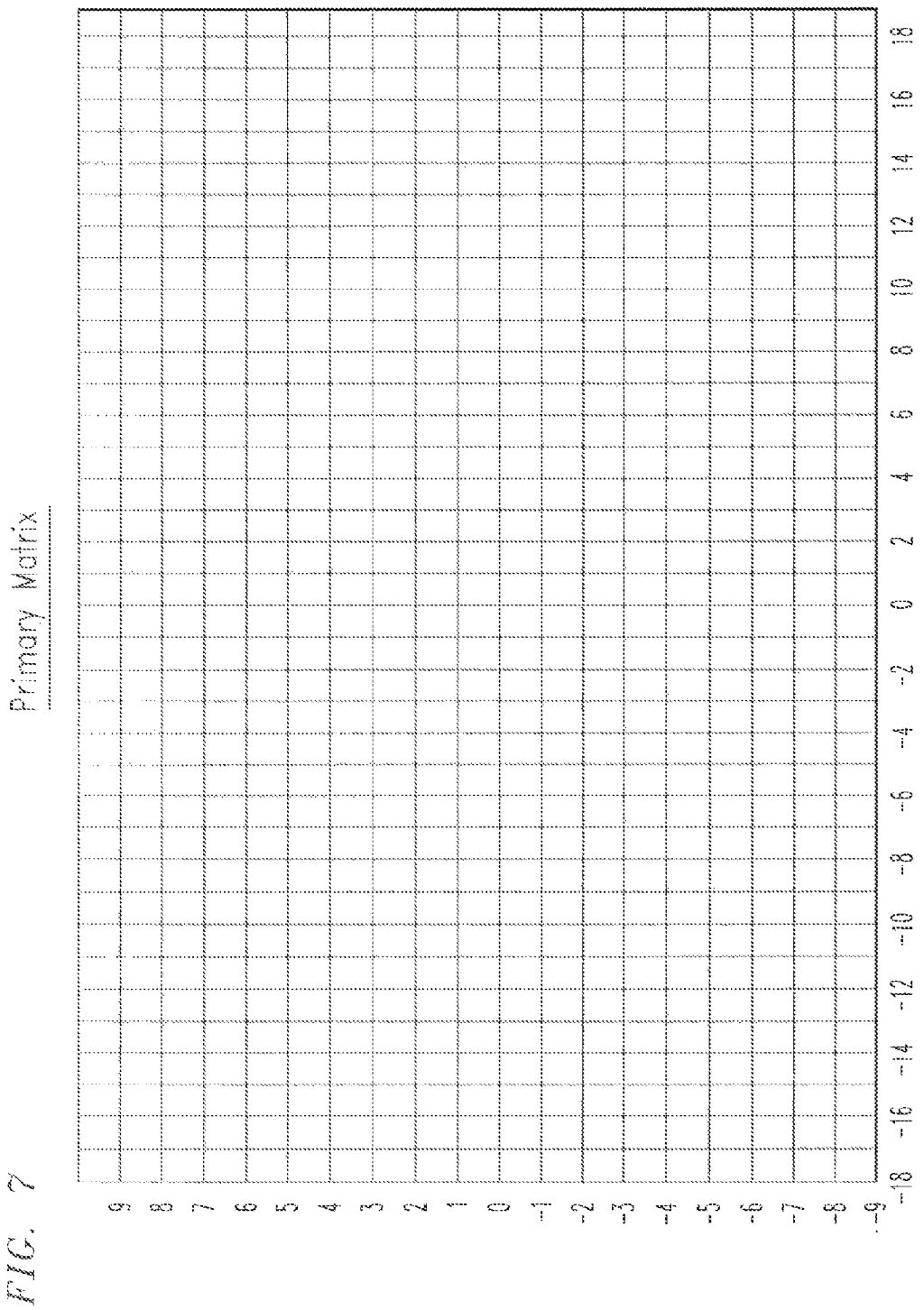

Primary Matrix
18 16 14 12 10 8 6 4 2 0 -2 -4 -6 -8 -10 -12 -14 -16 -18
9 8 7 6 5 4 3 2 1 0 -1 -2 -3 -4 -5 -6 -7 -8 -9

FIG. 7

# IALERT ENHANCED ALERT MANAGER

This application is a continuation of U.S. patent application Ser. No. 13/338,978, filed on Dec. 28, 2011, entitled "iAlert Enhanced Alert Manager"; which claims priority from U.S. Provisional 61/457,744, entitled "iAlert Enhanced Alert Manager", filed May 25, 2011; and is a continuation-in-part of U.S. patent application Ser. No. 13/064,796, entitled "N-Dimensional Affinity Confluencer", filed Apr. 15, 2011, now U.S. Pat. No. 8,688,087; which claims priority from U.S. Provisional 61/457,145, filed on Jan. 14, 2011, entitled "N-Dimensional Affinity Confluencer" and U.S. Provisional 61/457,061, filed on Dec. 17, 2010, entitled "N-Dimensional Affinity Confluencer", the entirety of all of which are explicitly incorporated herein by reference.

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to telecommunications. More particularly, it relates to wireless based technologies.

2. Background of Related Art

The present inventors have appreciated that there are a wide variety of events and happenstance that a person might benefit from knowing about, either before the event happens or very shortly after the event happens. For instance, persons near significant events (e.g. vehicle collisions, natural catastrophes, fires, etc.) may otherwise have no direct need to be notified of the simple occurrence of the event, but may very much like to get clarification of the nature of the event. Persons near less obvious events and happenstance (e.g. one's neighbor just dialed 9-1-1) may want to receive both notification of the event/happenstance as well as information clarifying the nature of the event/happenstance.

There is a need for persons to receive notification and clarifying information about events and happenstance that occur at a distance from a person if the event has significant enough area of effect (e.g. volcanic eruption), and/or if the event is within close enough proximity to someone about whom the person cares, and/or if the event is within close enough proximity to something about which the person holds some regard.

## SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, a method of providing notification to a wireless device regarding an event with an area of effect that encompasses said wireless device, or a list of alternate wireless devices pre-designated by the subscriber to whom said wireless device belongs, or a list of places (i.e. locations) pre-designated by the subscriber to whom said wireless device belongs; said list of wireless device and alternate wireless devices and locations constituting an affinity group. A sphere of influence (SPIN) is defined around each wireless device. Every event constitutes a plane of interaction that may or may not intersect these SPINs; said intersection depending on the event's area of effect. An affinity confluence is recognized between each and every event that intersects (i.e. encompasses) one or more constituent components of an affinity group (i.e. location of an identified wireless device or location of a designated place). Affinity confluence is evaluated and recognized for every affinity group. Recognition of affinity confluence stimulates a relevant notification to be initiated to the subscriber's wireless device.



## BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the present invention become apparent to those skilled in the art from the following description with reference to the drawings, in which:

FIG. **1** depicts the function of an exemplary sentinel service provided by the iAlert_Enhanced_Alert_Manager, in accordance with the principles of the present invention.

FIG. **2** depicts five (5) exemplary data structures with which to manage affinities, SPINs, and the identification of relationships therebetween.

FIG. **3** depicts two (2) exemplary data structures with which to manage iAlert-vectors and the notifications that are the ultimate purpose of the iAlert-vector, in accordance with the principles of the present invention.

FIG. **4** depicts one (1) exemplary data structure with which to manage iEvent-vectors, in accordance with the principles of the present invention.

FIG. **5** depicts a wireless device user's location, in accordance with the principles of the present invention.

FIG. **6** shows an exemplary location (LOC) table, in accordance with the principles of the present invention.

FIG. **7** shows an exemplary primary matrix, in accordance with the principles of the present invention.

## DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

In accordance with the principles of the present invention, a method and system is provided to notify a wireless device about events/happenstance that have occurred within proximity of persons, places, and/or things in which a user has registered an interest. The system comprises a sentinel service provided by a suitable alert manager, e.g., an iAlert_Enhanced_Alert_Manager in a physical server device in communication with the wireless device.

A person with a mobile device may define a Sphere of Influence (SPIN) through which a multitude of planes of interaction pass and occasionally intersect. The intersection of planes of affinity within that person's Sphere of Influence (SPIN) constitutes a confluence of affinity that may either positively induce a person (attractive inducement) or negatively induce a person (repulsive inducement).

In accordance with the principles of the present invention, the sentinel service provided by the iAlert_Enhanced_Alert_Manager comprises data structures to manage affinities, Spheres of Influence (SPINS), and the identification of relationships therebetween. Five exemplary data structures maintained in the sentinel service include an Affinity Table, a Keyword-List Table, a SPIN Table, a SPIN-List Table, and an Affinity-List Table.

Transmission of a notification to an iAlert user's device concerning a particular event/happenstance, in accordance with the principles of the present invention, is determined as a function of both the magnitude of the event/happenstance and the proximity of the event/happenstance to persons, places and/or things that an iAlert user has pre-designated as "important."

Timely notification of events/happenstance to a user's mobile device comprises the computation of a multitude of iEvent-vectors and iAlert-vectors, in accordance with the principles of the present invention. An iEvent-vector comprises information pertaining to a particular event/happenstance whereas an iAlert-vector comprises information pertaining to notifications regarding events/happenstance. In accordance with another aspect of the present invention, a method and system enables a user to query the iAlert_En-

hanced_Alert_Manager regarding the current state of a wireless device associated with a person, place, or thing in which the user has registered an interest. The current state of one to many vectors is assessed of either positive (i.e. attractive inducement) or negative (i.e. repulsive inducement) affinity.

The sentinel service may also notify a user's wireless device regarding events/happenstance that have not yet occurred but are deemed likely to occur within a parametrically defined proximity of persons, places, and/or things associated with respective wireless devices, and in which the user has identified an interest, in accordance with yet another aspect of the present invention.

In yet another embodiment of the present invention, timely evaluation of notifications to a user's wireless device is accomplished with a geographically defined nexus ("GeoNEXUS") and a four (4) tier data structure representing the location of iAlert-vectors and iEvent-vectors. GeoNEXUS rapidly identifies all iAlert-vectors within a predefined/ preconfigured close proximity to an iEvent-vector, to assist in the timely transmission of notifications to users, regarding relevant events and happenstance.

The present invention describes a method and system that notifies one or more wireless devices, hereafter referred to as party-A, about events and happenstance that a user has registered an interest in. The present invention also describes a method and system to warn wireless devices of events that are likely to occur. The need for notification is determined as a function of both the magnitude of the event/happenstance and the proximity of the event/happenstance to wireless devices associated with persons, places, and/or things pre-designated by party-A as "important".

The present invention additionally describes a method and system by which wireless devices such as Party-A can query the iAlert_Enhanced_Alert_Manager to assess the current state of one to many vectors of either positive (i.e. attractive inducement) or negative (i.e. repulsive inducement) affinity pertaining to pre-designated wireless devices associated with persons, places, and/or things.

First, the present invention allows Party-A to define persons, places, and/or things about which Party-A has a vested interest. Designation of persons, places, and/or things can be accomplished via various methods, including, but not limited to, calling a service center represented by either a human call-taker or an Interactive Voice Response (IVR) system, sending an activation SMS short message, sending an activation Email, or interacting with a full featured Internet web site.

Persons are identified by a mobile identification number corresponding to a phone that the person of interest is likely carrying. Mobile identification numbers used to identify individuals include, but are not limited to, cellular phone numbers, LTE phone numbers, and nomadic/mobile Voice over IP (VoIP) phone numbers. A list of examples of mobile identification numbers would include, but not be limited to, Radio Frequency Identifier [RFID], Electronic Serial Number [ESN], Mobile Identification Number [MIN], Mobile Directory Number [MDN], International Mobile Subscriber Identity [IMSI], International Mobile Equipment Identity [IMEI], Mobile Equipment Identifier [MEID], and Mobile Subscriber ISDN Number [MSISDN].

Places are identified by location, including, but not limited to, a valid postal address, a Master Street Address Guide (MSAG) record, or a latitude/longitude pair.

Things are identified by Radio Frequency Identifier (RFID) (e.g. LoJack Tag Number) or by location, including, but not limited to, a valid postal address, a Master Street Address Guide (MSAG) record, or a latitude/longitude pair. A latitude/longitude pair for an object may be attained using built-in GPS/GLONASS/GALILEO/GNSS receiver technology. Alternatively, if a mobile device is used to activate the sentinel service, then a latitude/longitude pair identifying an object may be recorded during activation.

FIG. **1** depicts the function of an exemplary sentinel service provided by the iAlert_Enhanced_Alert_Manager, in accordance with the principles of the present invention.

In particular, FIG. **1** illustrates nine (9) different persons, places, or things in which one iAlert subscribing wireless device has advertised an interest, as well as three (3) different events about which the iAlert subscribing wireless device may want to be notified.

In the example depicted in FIG. **1**, the iAlert subscribing wireless device has registered an interest in their own wireless device **100**, their spouse's wireless device **101**, their son's wireless device **102**, their daughter's wireless device **103**, their mother's wireless device **104**, their home's location **105**, their parents' home's location **106**, their children's school's location **107**, and their car wireless device **108**.

Moreover, the example in FIG. **1** also depicts three (3) exemplary events the iAlert subscribing wireless device may be notified about. Exemplary potential events of interest include a train derailment **110** with a declared 3-square block evacuation area **120**, a vehicle fire **111** with a 200 foot area of effect **121**, and a 9-1-1 call in-progress with a declared 200 foot area of potential influence **122**, inside which a medical first responder or good Samaritan could provide timely cardio-pulmonary resuscitation (CPR) to the heart attack victim who has dialed 9-1-1.

In the example depicted in FIG. **1**, the magnitude of the train derailment **120** is not big enough to encompass any of the nine (9) persons/places/things in which the iAlert subscribing wireless device has registered an interest. Thus, the train derailment is not considered a threat and a notification is not sent to the iAlert subscribing wireless device.

The area of potential influence **122** associated with the 9-1-1 call in-progress, in the example depicted in FIG. **1**, is big enough to encompass the iAlert subscribing wireless device's current location **100**. Though, the subscriber who owns the iAlert registered wireless device has declared neither an affinity for "medical first responder" nor an affinity for "good samaritanism" so a notification is not sent to the iAlert registered wireless device.

The area of effect associated with the vehicle fire **111**, in the example depicted in FIG. **1**, encompasses the location that the iAlert subscriber has recorded for their car **108**. The iAlert subscriber would certainly like to be made aware of this event, so a notification is sent to the iAlert subscribing wireless device.

Facilitation of the type of notification sent to an iAlert subscriber regarding a particular event/happenstance depends upon whether the iAlert sentinel pertains to a person, place, or thing.

In a somewhat inverted view of the universe, a mobile device defines a Sphere of Influence (SPIN) through which a multitude of planes of interaction pass and occasionally intersect. The intersection of planes of interaction within a wireless device's sphere of influence constitutes a confluence of affinity that may either positively induce a person (attractive inducement) or negatively induce a person (repulsive inducement).

Due to the varied nature of inducements, in accordance with the present invention, sentinels for persons depend upon a Sphere of Influence (SPIN) table, an AffinityList table, and an Affinity table to determine the precise nature of any notifications to be sent.

FIG. **2** depicts five (5) exemplary data structures with which to manage affinities, SPINs, and the identification of relationships therebetween.

In the example illustrated in FIG. **2**, all affinities are maintained using two (2) specific data structures: an Affinity Table **130**, and a Keyword-List Table **134**.

All participating SPINs are maintained using one (1) primary data structure: a SPIN Table **132**.

The relationship between affinities and SPINs is managed using, e.g., two (2) additional data structures: a SPIN-List Table **136**, and an Affinity-List Table **138**.

Each record or row in the Affinity Table **130** includes, but is not limited to, an Affinity ID (i.e. the primary key), a Keyword-List Link, and a SPIN-List Link. In the given example, every defined Affinity must have at least one Keyword-List entry (i.e. at least one keyword) with which to uniquely identify the Affinity. Keyword-List Link fields are preferably not allowed to be set to a

TERMINATOR value. Affinities that are defined but have zero (0) associated SPINs must set the SPIN-List Link for the Affinity to a TERMINATOR value **131**.

Note that in this description the word "Link" is used to denote any reference/dereference mechanism used to access information from a data structure other than the data structure in which the Link resides.

Each record or row in the Keyword-List Table **134** includes, but is not limited to, a Keyword-List ID (i.e. the primary key), a Keyword, an Affinity Link, and two (2) Keyword-List Link values, PRECEDE and SUCCEED. PRECEDE and SUCCEED are two (2) Keyword-List Link values used to create a doubly-linked list of the keywords that serve to uniquely identify an Affinity.

The Keyword field of a Keyword-List entry may be set to any representation of a keyword except the null or empty set. The Affinity Link field of a Keyword-List entry must refer back to one and only one associated Affinity Table entry. Affinity Link fields are not allowed to be set to a TERMINATOR value. The PRECEDE and SUCCEED fields of a Keyword-List entry are also not to be set to a TERMINATOR value. The PRECEDE and SUCCEED fields must always refer to an entry in the Keyword-List Table. Keyword-Lists that are comprised of one and only one (1) keyword will set the values of both PRECEDE and SUCCEED to refer to the sole Keyword-List entry in the table. Thus, in a Keyword-List Table comprising of only one entry, PRECEDE and SUCCEED values refer to or point to one another **135**.

Every participating SPhere of INfluence (SPIN) in the present invention is represented by one (1) and only one entry in the SPIN Table **132**. Each record or row in the SPIN Table **132** includes, but is not limited to, a SPIN ID (i.e. the primary key), miscellaneous SPIN information, and an Affinity-List Link. Miscellaneous SPIN information may be a multitude of sub-fields, some of which may actually refer to other data structures or other data sources entirely. Participating SPINs for which zero (0) affinities have been identified, must set the Affinity-List Link value for the SPIN to a TERMINATOR value **133**.

Relationship or association between Affinities and SPINs is managed using both the SPIN-List Table **136** and the Affinity-List Table **138**. The SPIN-List Table **136** is intended to permit a device to start with one (1) entry in the Affinity Table and find all SPINs associated with that Affinity. Alternatively, the Affinity-List Table is intended to permit a device to start with one (1) entry in the SPIN Table and find all Affinities associated with that SPIN.

Each record or row in the SPIN-List Table **136** includes, but is not limited to, a SPIN-List ID (i.e. the primary key), an Affinity Link, a SPIN Link, and two (2) SPIN-List link values, PRECEDE and SUCCEED. PRECEDE and SUCCEED are two (2) SPIN-List link values used to create a doubly-linked list of SPINs associated with an Affinity. The Affinity Link and SPIN Link fields are not allowed to be set to a TERMINATOR value. Entries in the SPIN-List Table are only created when a relationship between an Affinity and a SPIN is created. Thus, there is always both a reference to an Affinity as well as a reference to a SPIN in the SPIN-List Table, PRECEDE and SUCCEED fields must always refer to an entry in the SPIN-List Table. SPIN-Lists that are comprised of one and only one (1) SPIN, set the values of both PRECEDE and SUCCEED to refer to the sole entry in the SPIN-List table. Thus, in a SPIN-List Table comprising of only one entry, PRECEDE and SUCCEED values refer to or point to one another **137**.

Each record or row in the Affinity-List Table **138** includes, but is not limited to, an Affinity-List ID (i.e. the primary key), an Affinity Link, a SPIN Link, and two (2) Affinity-List link values, SUCCEED and PRECEDE. Affinity-List link values SUCCEED and PRECEDE are used to create a doubly-linked list of the Affinities associated with a particular SPIN. The Affinity Link and SPIN Link fields are preferably not allowed to be set to a TERMINATOR value. Entries in the Affinity-List Table are only created when a relationship between an Affinity and a SPIN is created. Thus, there is always both a reference to an Affinity as well as a reference to a SPIN in an Affinity-List table. PRECEDE and SUCCEED fields must always refer to an entry in the Affinity-List Table. Affinity-Lists that are comprised of one and only one (1) Affinity, set the values of both PRECEDE and SUCCEED to refer to the sole entry in the Affinity-List table. Thus, in an Affinity-List Table comprised of only one entry, PRECEDE and SUCCEED values refer to or point to one another **139**.

Definition and activation of the sentinel service provided by the iAlert_Enhanced_Alert_Manager, on a person, place, or thing, initiates the computation of two (2) or more vectors. Such vectors, for the purposes of this invention, shall hereafter be referred to as iEvent-vectors and iAlert-vectors, iEvent-vectors and iAlert-vectors are specifically meant to provide the basis for timely notification of relevant events and happenstance.

Facilitation of the type of notification sent when an iEvent-vector exceeds the threshold setting of an iAlert-vector depends upon whether the iAlert sentinel pertains to a person, place, or thing. Sentinels set on places and things will only generate notifications pertaining to threat events (i.e. repulsive inducements). Sentinels set on persons are more dynamic and might actually result in notifications intended to direct a person toward an event rather than away from it.

FIG. **3** depicts two (2) exemplary data structures with which to manage iAlert-vectors and the notifications that are the ultimate purpose of the iAlert-vector.

In the example illustrated in FIG. **3**, all iAlert-vectors are maintained using data in two (2) tables: an iAlert Table **140** and a Notification Table **141**.

Each row in the iAlert table **140** includes, but is not limited to, the following fields: iAlert_ID (i.e. the primary key), iAlert_initiated_by, Sentinel_Type, Latitude, Longitude, iAlert_Threshold, iAlert_Hysteresis, and Notification_Link. The iAlert_initiated_by field is a SPIN_ID value with which an entire row in the SPIN table **132** may be isolated. The iAlert_initiated_by field records the device that established the iAlert sentinel. A Sentinel_Type field records whether the relevant iAlert pertains to a PERSON, PLACE, or THING. An iAlert_Threshold value denotes the base iEvent MAGNITUDE required to stimulate transmission of a notification.

Additionally, an iAlert_Hysteresis value is used to prevent notification stutter pertaining to a particular event/happenstance. Once notification of an event has been transmitted, an "Event Concluded" notification, indicating the conclusion of an event, is not transmitted until the iEvent MAGNITUDE has been reduced to a value less than the difference between the iAlert_Threshold value and the iAlert_Hysteresis value (i.e. "iAlert_Threshold-iAlert$_{Hysteresis}$"). Thus, use of the iAlert_Hysteresis value prevents a barrage of event notifications and "Event Concluded" transmissions, should the event MAGNITUDE flutter, slightly above and below the iAlert_Threshold value. Notification_Link fields are not allowed to be set to a TERMINATOR value, considering the primary reason to activate an iAlert sentinel is to receive some sort of notification, stimulated by an iEvent. Hence, there must always be at least one record in the Notification Table **141** for every record present in the iAlert Table **140**. There may, however, be more than one record in the Notification Table **141** associated with a single record in the iAlert Table **140**.

Each row in the Notification Table **141** includes, but is not limited to, a Notification_ID (i.e. the primary key), a SPIN_ID, and a Notification_Next Link. The SPIN_ID field represents the device to which notifications shall be transmitted. The Notification_Next link value is used to identify the next device to which to transmit a notification. This linked list structure in the Notification Table allows a single sentinel detection to result in notification transmissions to multiple recipients. There will always be at least one row in the Notification Table for every row in the iAlert Table. The last row in a linked list of notification records associated with a single iAlert record will set the Notification_Next link value to a TERMINATOR value **142** to represent the end of the linked list.

This invention presumes that iAlert sentinels established for PLACEs and/or THINGs are intended to provide repulsive inducement. Repulsive inducements are transmitted to issue a warning on a wireless device that has activated a sentinel, so that the user of this wireless device may attempt to prevent or avoid negative effect to the PLACE or the THING that a notification is referring to, including but not limited to theft and/or damage.

This invention further presumes that iAlert sentinels established for PERSONs are intended to take full advantage of all facets of the Affinity Table (see FIG. **2**) including, but not limited to, all attractive and repulsive inducements identified via the Affinity List and uniquely associated with the device that activated the iAlert sentinel upon the PERSON (i.e. iAlert_initiated_by).

In the example depicted in FIG. **3**, an iAlert-vector is comprised of a single iAlert Table record, which is linked to three (3) Notification Table records. The device that activated the sentinel for the iAlert-vector in the example depicted in FIG. **3**, is named as one of the three notification recipients. Therefore, the iAlert_initiated_by field in the iAlert Table record and the first Notification record in the notification linked list both link to the same SPIN Table record. The second and third Notification records in the notification linked list, link to different SPIN Table records.

Were the sentinel in the iAlert-vector providing overwatch for a PERSON, then the AffinityList indicated in the SPIN table would be dereferenced for all SPINs referenced by the notification linked list, such that any and all iEvents associated with the list of affinities for each SPIN would be evaluated for possible transmission of notification(s).

FIG. **4** depicts one (1) exemplary data structure with which to manage iEvent-vectors, in accordance with the principles of the present invention.

Each row in an iEvent-vector table is used to assess a particular event of interest and includes, but is not limited to, the following fields: iEvent_ID (i.e. the primary key), Event_Type, Magnitude, Centroid_X, Centroid_Y, Centroid_Z, Area_of_Effect_Radius, Shape_Type, Angle_of_Rotation, Angular_Extent, Dist2Foci-A, Dist2Foci-B, Primary_Length and Secondary_Length. The Event_Type and Magnitude fields are both used to assess and determine notifications that are relevant to a particular iEvent. Centroid_X, Centroid_Y, and Centroid_Z fields encompass three (3) coordinates used to record the center of an event. The Area_of_Effect_Radius is a radius value that indicates the general area of effect and provides very rapid assessment as to whether further analysis of the event is necessary. If the central point and radius of the iEvent-vector does not encompass the location of an iAlert-vector, then notification is not merited. The Shape_Type enumerated field includes but is not limited to the following values: POINT, CIRCLE, ELLIPSE, ARC, and ARC_BAND. The Angle_of_Rotation value is measured from true North. The Angular_Extent field is used to assess ARCs and ARC_BANDs. The Distance to Foci A (i.e. Dist2Foci-A) and Distance to Foci B (i.e. Dist2Foci-B) values designate the Foci of an ellipse measured from the Centroid. The Primary_Length and Secondary_Length values represent either the Major and Minor Axes lengths for an ellipse or the inner and outer radius values for ARCs and ARC_BANDs.

The present invention includes but is not limited to three (3) different action types for iEvent-vectors: INITIATE, UPDATE, and CLEAR.

The INITIATE action causes a new row to be allocated to an iEvent-vector table. A new row in an iEvent-vector table preferably must include Event_Type, Magnitude, Centroid location, estimated Area_of_Effect_Radius, Shape_Type, and measurements necessary to define the shape indicated in the Shape_Type field. Declaration of an INITIATE action will stimulate the evaluation of iAlert-vectors within the area of effect for potential transmission of notifications.

An UPDATE action preferably must designate the iEvent_ID of the specific iEvent-vector being updated and then may include some subset of the following parameters: Magnitude, Centroid location, Area_of_Effect_Radius, Shape_Type and all measurements necessary to define the particular shape indicated in the Shape_Type field. UPDATE actions may not change Event_Type. Declaration of an UPDATE action will stimulate evaluation of all iAlert-vectors within the area of effect as well as all iAlert-vectors that have previously resulted in the transmission of a notification. iAlert-vectors for which notifications were previously sent, but are no longer within the area of effect, will receive an "Event Concluded" notification.

A CLEAR action must designate the iEvent_ID of the specific iEvent-vector being canceled and will force "Event Concluded" notifications to be sent to all recipients of iAlert-vector notifications. The CLEAR action will delete the iEvent-vector row associated with the designated iEvent_ID value.

Another embodiment of the present invention uses a GeoNEXUS. When an iEvent-vector is INITIATED, UPDATED, or CLEARED, the GeoNEXUS determines which iAlert-vectors are within close enough proximity to the iEvent-vector to be evaluated for possible notification. For the purposes of this embodiment the proximity evaluation is designed for speed of performance during proximity evaluation processing.

FIG. **5** depicts a wireless device user's location, in accordance with the principles of the present invention.

In particular, as shown in FIG. **5**, the present invention reduces the location of an iAlert-vector or iEvent-vector, represented, e.g., in decimal degrees of latitude and longitude, into indices of latitude and indices of longitude within four (4) layers: 1) Primary **150**: tens of degrees (~700 statute mile resolution); 2) Secondary **151**: degrees (~70 statute mile resolution); 3) Tertiary **152**: minutes (~6000 foot resolution); and 4) Quaternary **153**: seconds (~100 foot resolution). This implementation figuratively covers the Earth's surface with successively finer grained gridlines. Seconds of latitude and longitude yield a grid whose vertices are approximately 100 feet apart at the equator and somewhat closer together the farther away from the equator (North or South) the device is located.

Should the need arise to attain even finer granularity than seconds, a fifth (Quinary) and even sixth (Senary) layer may be added to represent 10ths of seconds (~10 feet) and 100ths of seconds (~12 inches).

Every time a location is registered, the GeoNEXUS will save the associated identifier, location (latitude and longitude), and optimization indices in a LOC table.

FIG. **6** shows an exemplary location (LOC) table, in accordance with the principles of the present invention.

In particular, as shown in FIG. **6**, the Lat and Lon values are normalized to be decimal degrees in the range −90.0 through +90.0 for Latitude and −180.0 through+180.0 for Longitude. The indices are computed thusly:

PrimaryX=int(round((Lon/10.0)−0.5))

PrimaryY=int(round((Lat/10.0)−0.5))

PrimaryZ=*Altitude modulo* 700 statute miles

SecondaryX=int(truncate(Lon−(PrimaryX*10.0)))

SecondaryY=int(truncate(Lat−(PrimaryY*10.0)))

SecondaryZ=*Altitude modulo* 70 statute miles

TertiaryX=int(truncate((Lon−((PrimaryX*10.0)+SecondaryX))*60.0))

TertiaryY=int(truncate((Lat−((PrimaryY*10.0)+SecondaryY))*60.0))

TertiaryZ=*Altitude modulo* 6000 feet

QuaternaryX=int(truncate((Lon−((PrimaryX*10.0)+SecondaryX+(TertiaryX/60.0)))*3600.0))

QuaternaryY=int(truncate((Lat−((PrimaryY*10.0)+SecondaryY+(TertiaryY/60.0)))*3600.0))

QuaternaryZ=*Altitude modulo* 100 feet

Note that these equations presume that the round( )function always rounds an "n.5" value up so that 0.5 becomes 1.0, 2.5 becomes 3.0, −3.5 becomes −3.0, etc. Some adjustments may be necessary to accommodate specific hardware architectures, operating systems, and compilers, as will be appreciated by those of skill in the art.

The intent, though, is to compute an index based on the lower left corner of the square in which the iAlert-vector/iEvent-vector is located. The Primary square (See 'Q' in FIG. **5**) is a 10 degree by 10 degree square. The Secondary square (See 'R' in FIG. **5**) is a one degree by one degree square located within the Primary. The Tertiary square (See 'S' in FIG. **5**) is a one minute by one minute square located within the Secondary. The Quaternary square (See 'T' in FIG. **5**) is a one second by one second square located within the Tertiary.

These computations produce values in the following ranges:

−18<=PrimaryX<=18 −9<=PrimaryY<=9 −1<=PrimaryZ<=36

0<=SecondaryX<=9 0<=SecondaryY<=9 −1<=SecondaryZ<=357

0<=TertiaryX<=60 0<=TertiaryY<=60 −1<=TertiaryZ<=22,000

0<=QuaternaryX<=60 0<=QuaternaryY<=60 −3<=QuaternaryZ<=1.32e06

FIG. **7** shows an exemplary primary matrix, in accordance with the principles of the present invention.

In particular, as shown in the primary matrix of FIG. **7**, the GeoNEXUS maintains a collection of matrices. This collection of matrices always includes a matrix for the Primary indices (i.e. a "Primary Matrix").

The primary matrix is accompanied by a PrimaryCount indicating how many iAlert-vectors/iEvent-vectors are present.

The Primary Matrix is also accompanied by an array or list of the primary matrix elements in which iAlert-vectors/iEvent-vectors can be found. (The list is empty if PrimaryCount is zero.)

Each element in the 36×18 Primary matrix contains: (1) a count of how many iAlert-vectors/iEvent-vectors are present in the corresponding 10deg×10deg area; and (2) a reference to a Secondary Matrix. (The reference is NULL if count is zero).

Secondary (10×10 matrix), Tertiary (60×60), and Quaternary (60×60) matrices are allocated, maintained, and eliminated as needed to manage GeoNEXUS memory use.

Each Secondary Matrix is accompanied by a SecondaryCount indicating how many iAlert-vectors/iEvent-vectors are present in the corresponding 10deg×10deg area.

Each Secondary Matrix is also accompanied by an array or list of the secondary matrix elements in which iAlert-vectors/iEvent-vectors can be found. (The list is empty if its SecondaryCount is zero.)

Each element in a 10×10 Secondary matrix contains: (1) a count of how many iAlert-vectors/iEvent-vectors are present in that particular 1deg×1deg area; and (2) a reference to a Tertiary Matrix. (The reference will be NULL if the count is zero.)

Each Tertiary Matrix is accompanied by a TertiaryCount indicating how many iAlert-vectors/iEvent-vectors are present in the corresponding 1deg×1deg area.

Each Tertiary Matrix is also accompanied by an array or list of the tertiary matrix elements in which iAlert-vectors/iEvent-vectors can be found. (The list is empty if its TertiaryCount is zero.)

Each element in a 60×60 Tertiary matrix contains: (1) a count of how many iAlert-vectors/iEvent-vectors are present in that particular 1 minute×1 minute area; and (2) a reference to a Quaternary Matrix. (The reference is NULL if count is zero.)

Each Quaternary Matrix is accompanied by a QuaternaryCount indicating how many iAlert-vectors/iEvent-vectors are present in the corresponding 1 min×1 min area.

Each Quaternary Matrix is also accompanied by an array or list of the quaternary elements in which iAlert-vectors/iEvent-vectors can be found. (The list is empty if QuaternaryCount is zero.)

Each element in a 60×60 Quaternary matrix contains: (1) a count of how many iAlert-vectors/iEvent-vectors are present in that particular 1 second×1 second area; and (2) an array or list of iAlert-vectors/iEvent-vectors Identifiers that are present in the corresponding 1 sec×1 sec area. (The list is empty if count is zero.)

The evaluation of 'Z' axis differences are preferably not managed in a matrix structure but rather are evaluated in near real-time as a simple difference of like Z values (i.e. primary, secondary, tertiary, etc.). If the absolute value of the computed Z-difference (i.e. delta Z) is within the defined vertical bounds of proximity, then proximity has been successfully established.

Maintenance of this four (4) tier structure is complex but considered obvious to those skilled in data structures and is not described further in this disclosure.

This four (4) tier data structure makes it possible for the GeoNEXUS to rapidly identify all of the iAlert-vectors in a predefined or preconfigured close proximity to an iEvent-vector so that evaluation of notifications can be resolved in a timely manner.

Once the proximity of iEvent-vectors to iAlert-vectors has been established, it is a simple matter to evaluate the Magnitude value in the iEvent-vector versus the Alert_threshold value in the iAlert-vector. Evaluation of the iAlert-vector versus the iEvent-vector determines whether or not it is necessary to cycle through Notification records associated with the iAlert-vector to transmit the appropriate form of notification to the intended recipient,

The iAlert-Hysteresis value of the iAlert-vector is used with both the Magnitude of the iEvent-vector and the juxtaposition of location between the iEvent-vector and the iAlert-vector (i.e. proximity). Use of the iAlert_Hysteresis value prevents small fluxuations in the parameters of the iEvent-vector from pummeling recipients with a barrage of notifications. The value for the iAlert_Hysteresis is chosen by the user who established the iAlert sentinel, however, so the frequency of notification to the intended recipients varies from iAlert-vector to iAlert-vector.

While the invention has been described with reference to the exemplary embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.

What is claimed is:

**1**. A method of providing notification to a wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest, comprising:

obtaining at least one affinity established for notification to a given wireless device;

defining a sphere of influence (SPIN) about a given event distant from said wireless device;

determining a correlation between said at least one affinity and said sphere of influence about said given event; and

providing notification to said given wireless device regarding an effect from said given event.

**2**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, further comprising:

providing detailed information regarding said given event to said given wireless device.

**3**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

an effect on said user of said given wireless device is indirect to said given event.

**4**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

said given event is proximate to another wireless device relating to another whom said user of said wireless device has a predefined interest.

**5**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

said given event is proximate to a location about which said user of said wireless device has a predefined interest.

**6**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using a keyword-list database.

**7**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using an affinity-list database.

**8**. The method of providing notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **1**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using a spin-list database.

**9**. Apparatus to provide notification to a wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest, comprising:

a physical affinity server to gather at least one affinity relating to a plurality of wireless devices;

a physical location server to obtain a request for notification to a requesting wireless device, relating to said at least one affinity established for said notification to said given wireless device;

a physical sphere of influence (SPIN) server to define a sphere of influence about a given event distant from said requesting wireless device, said physical sphere of influence server being configured to determine a correlation between said at least one affinity and said sphere of influence about said given event, and provide a notification to said requesting wireless device regarding an effect from said given event.

**10**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said physical sphere of influence (SPIN) server is further configured to provide detailed information regarding said given event to said requesting wireless device.

**11**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said

wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

an effect on said user of said requesting wireless device is indirect to said given event.

**12**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said given event is proximate to said plurality of wireless devices relating to another whom said user of said requesting wireless device has a predefined interest.

**13**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said given event is proximate to a location about which said user of said requesting wireless device has a predefined interest.

**14**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using a keyword-list database.

**15**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using an affinity-list database.

**16**. The apparatus to provide notification to said wireless device regarding an effect from an event distant from said wireless device but having an area of effect about which a user of said wireless device has interest according to claim **9**, wherein:

said correlation between said at least one affinity and said sphere of influence about said given event is determined using a spin-list database.

* * * * *